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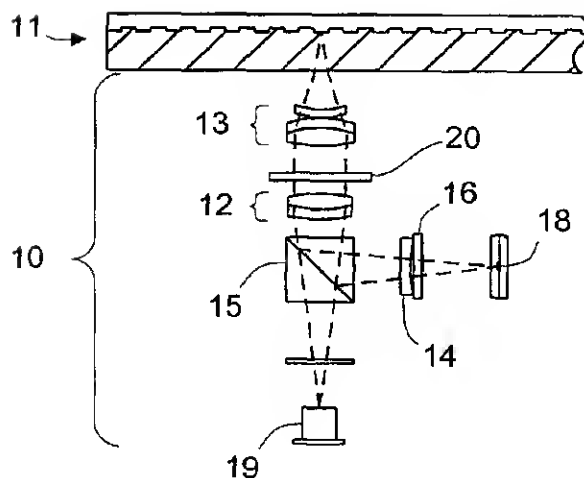


FIG. 1A

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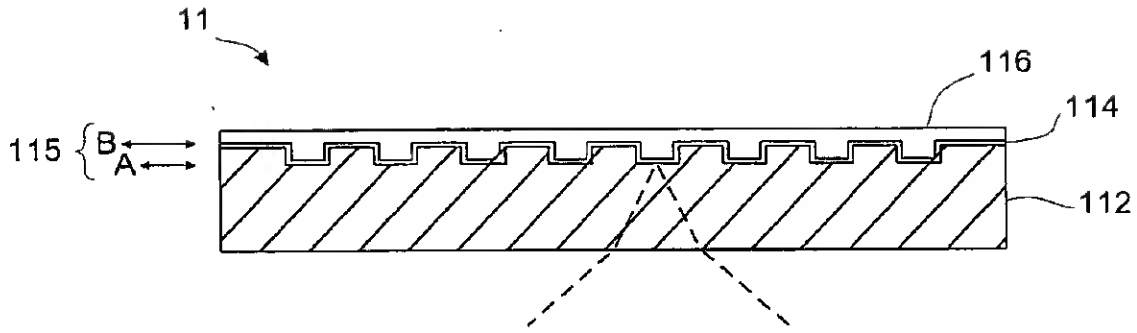


FIG. 1B

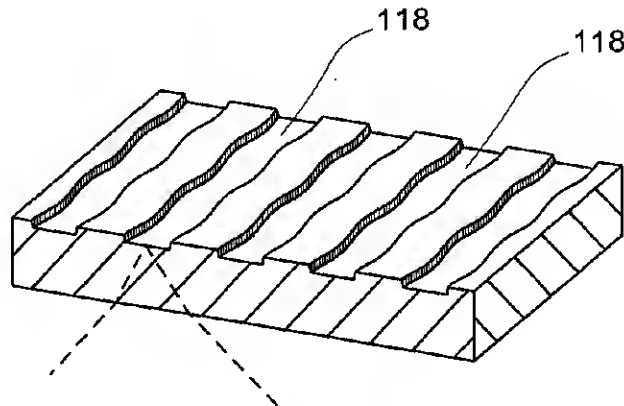


FIG. 1C

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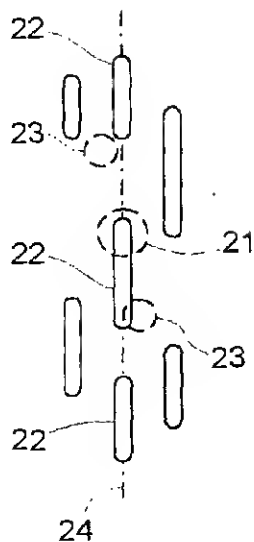


FIG. 2A

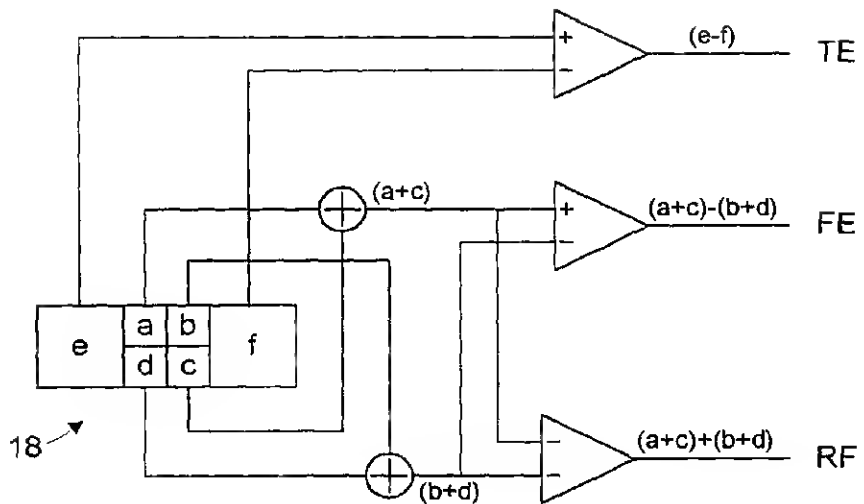


FIG. 2B

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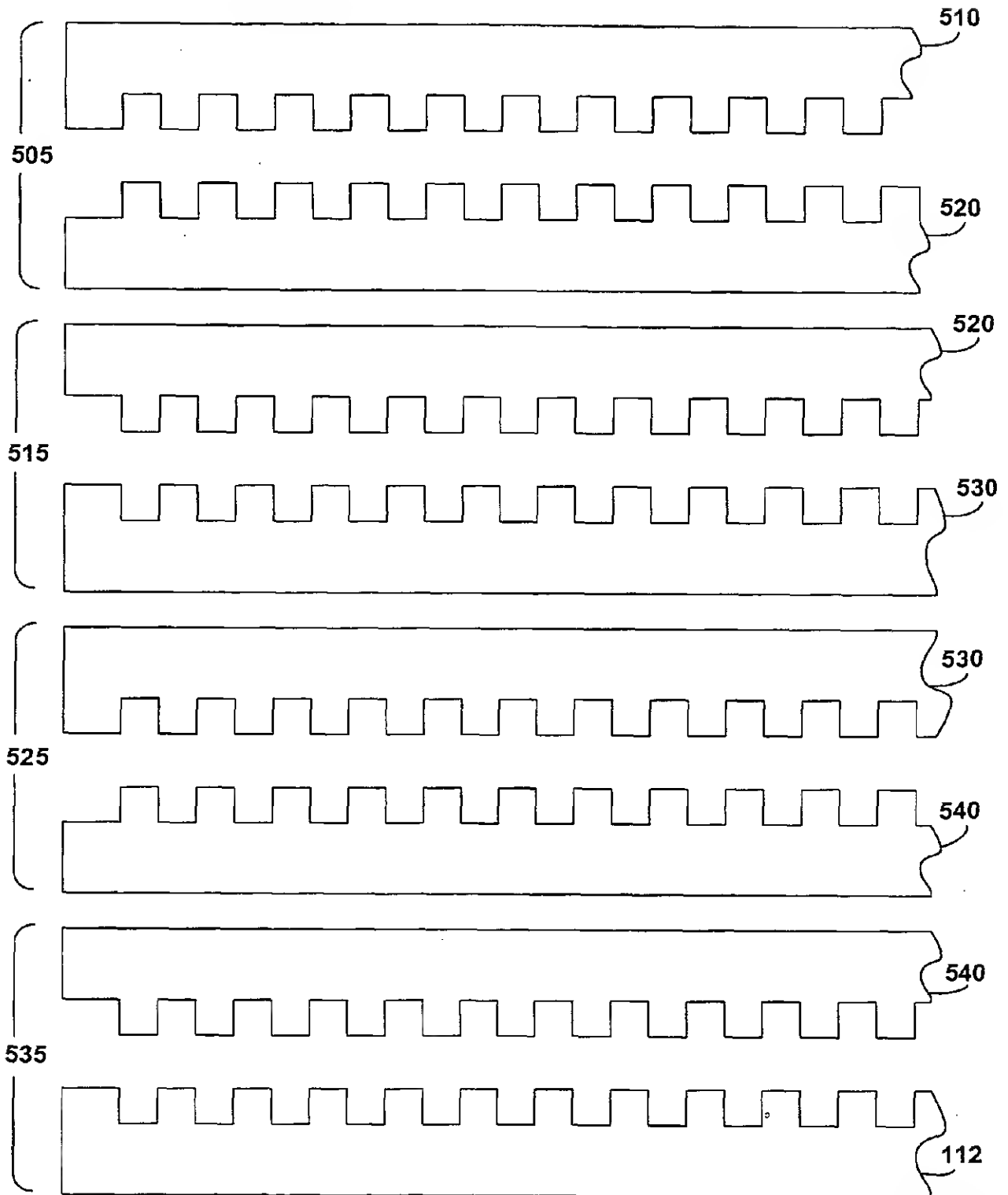
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FIG. 3A



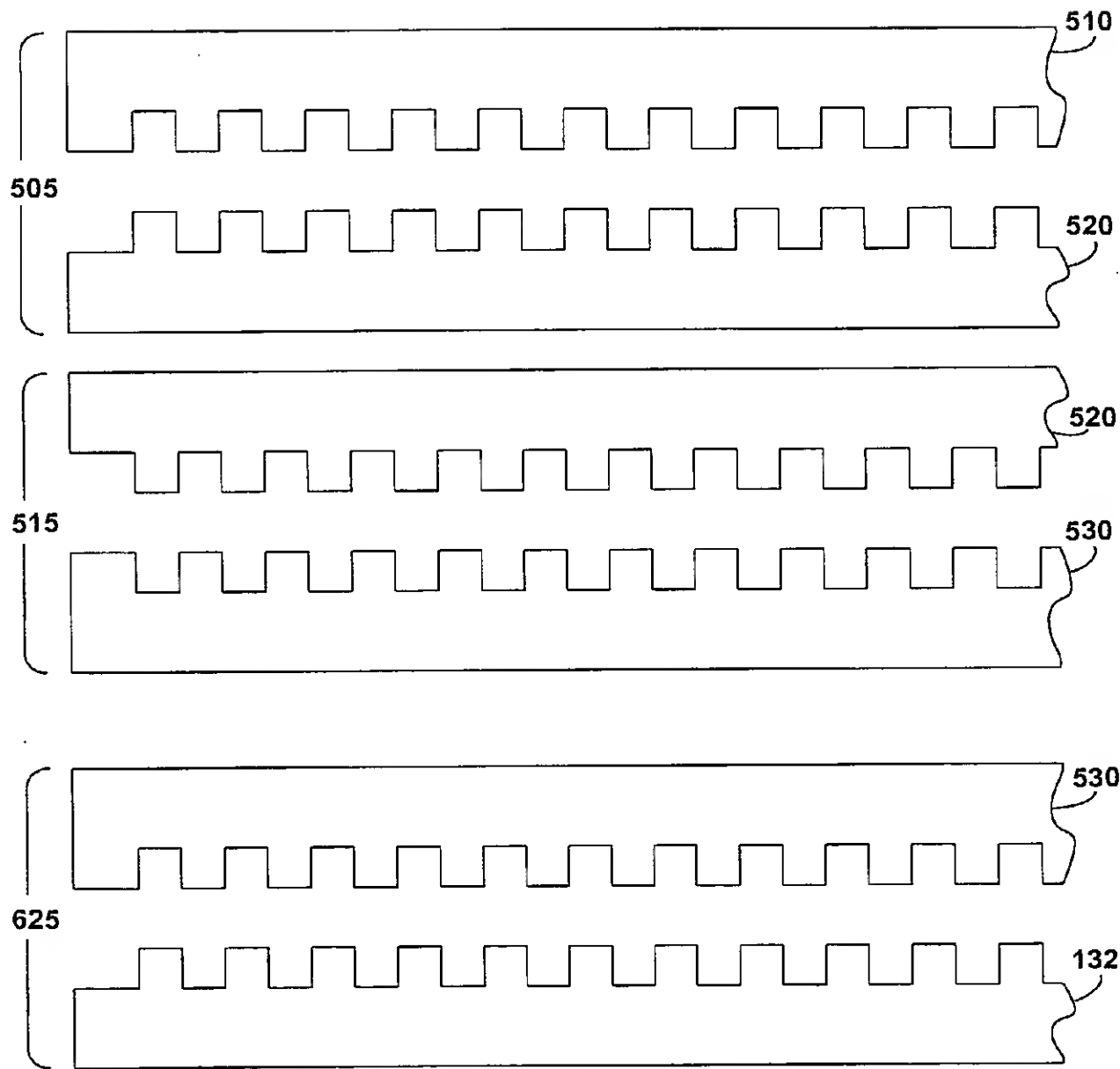
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FIG. 3B



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FIG. 3C

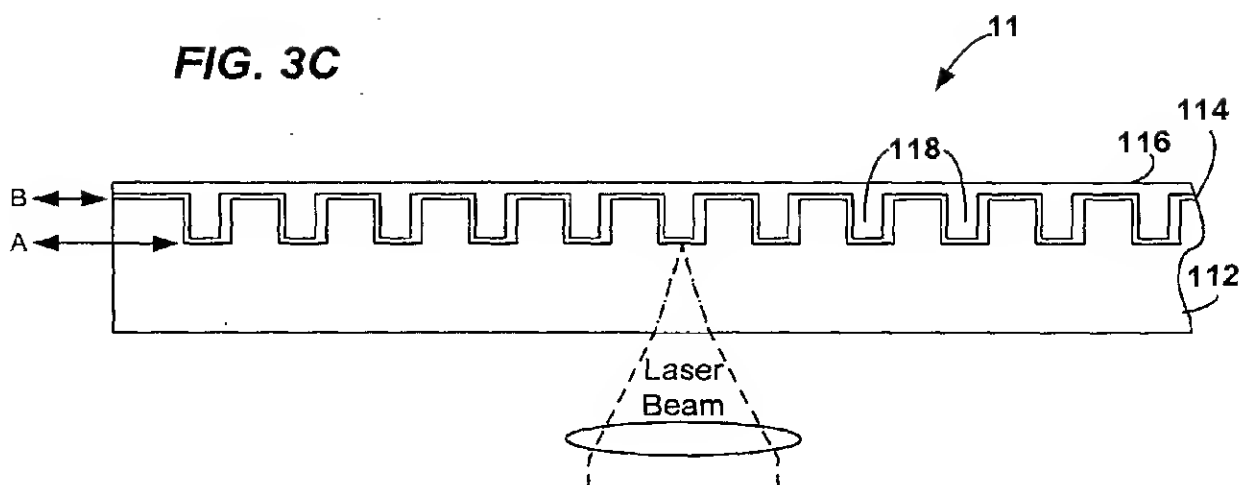


FIG. 3D

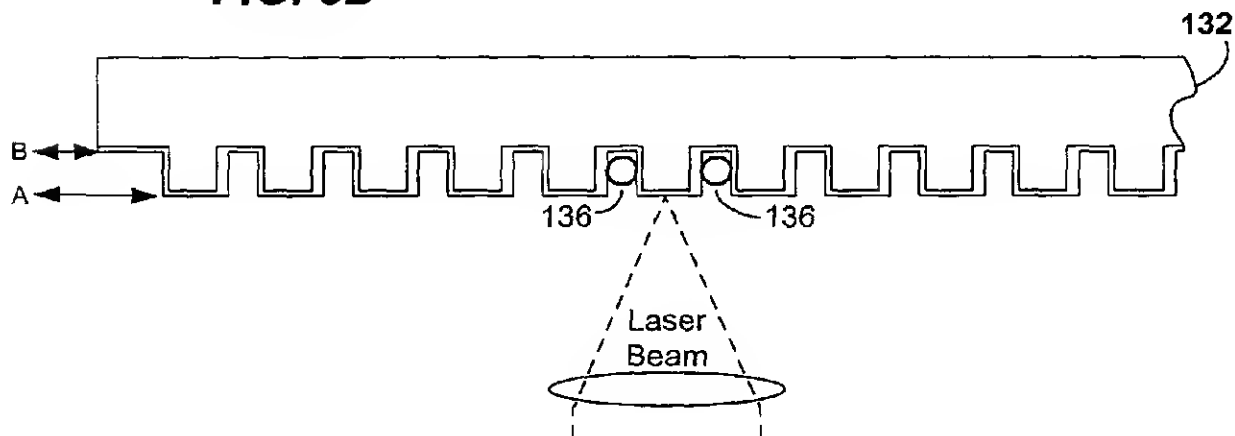
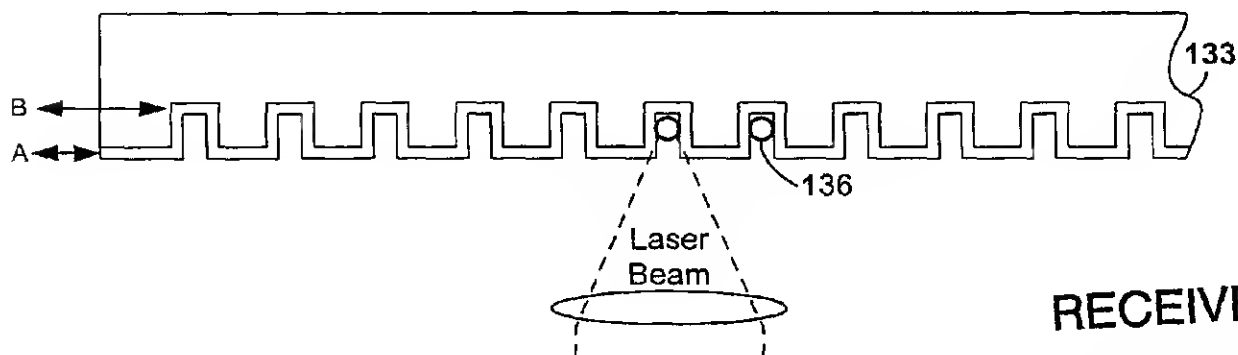


FIG. 3E



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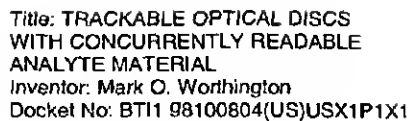


FIG. 4

FIG. 4

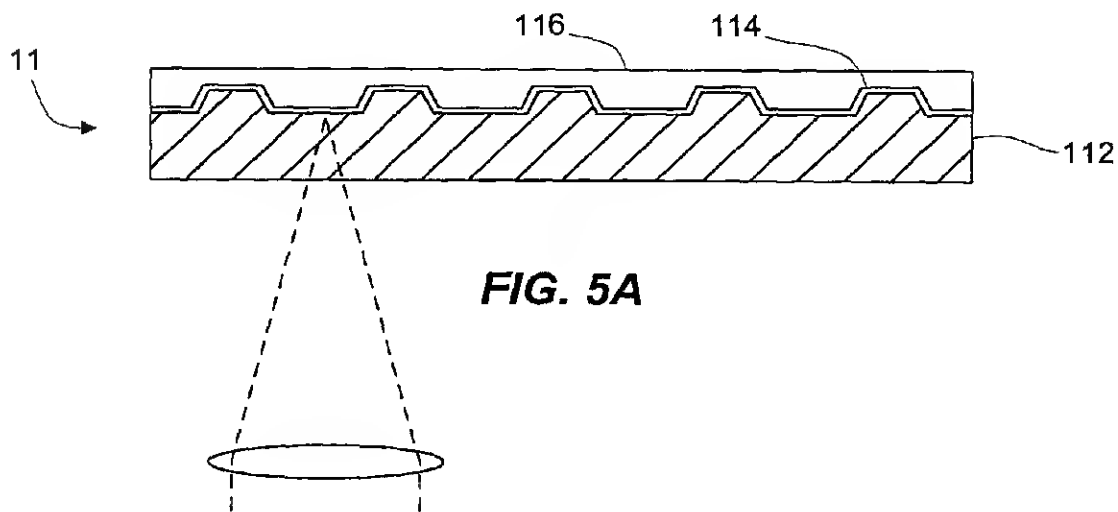


FIG. 5A

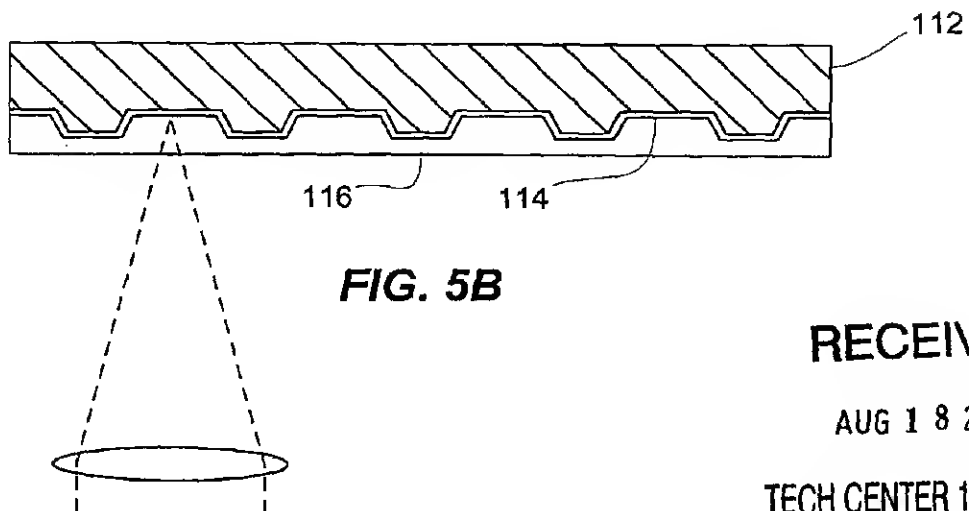


FIG. 5B

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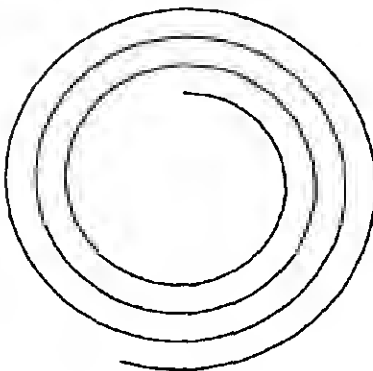


FIG. 5C

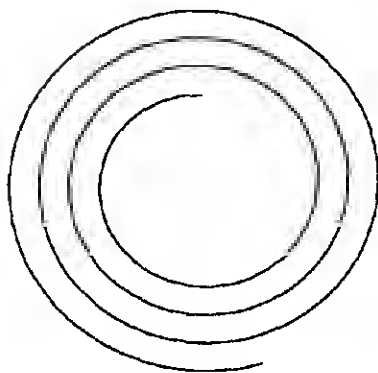


FIG. 5D

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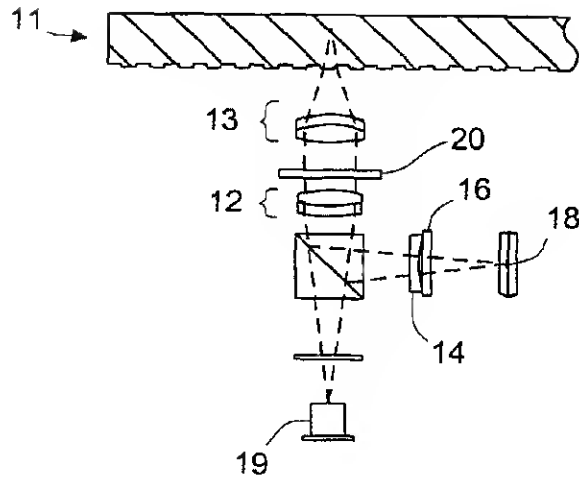


FIG. 6A

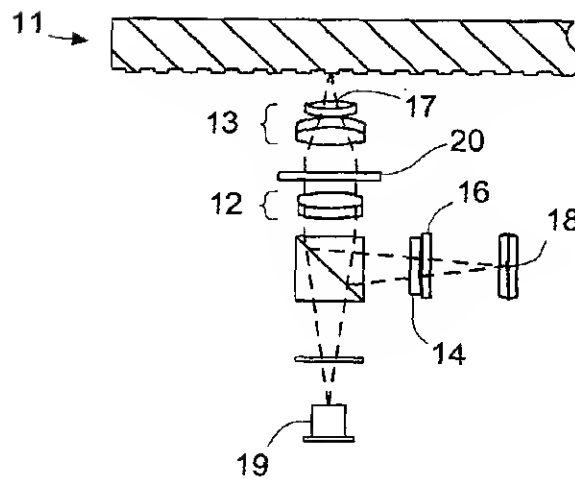


FIG. 6B

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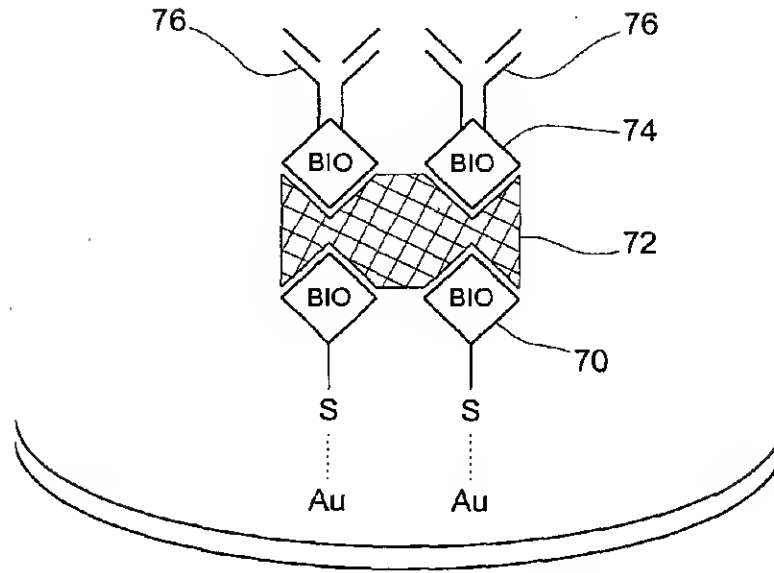


FIG. 7A

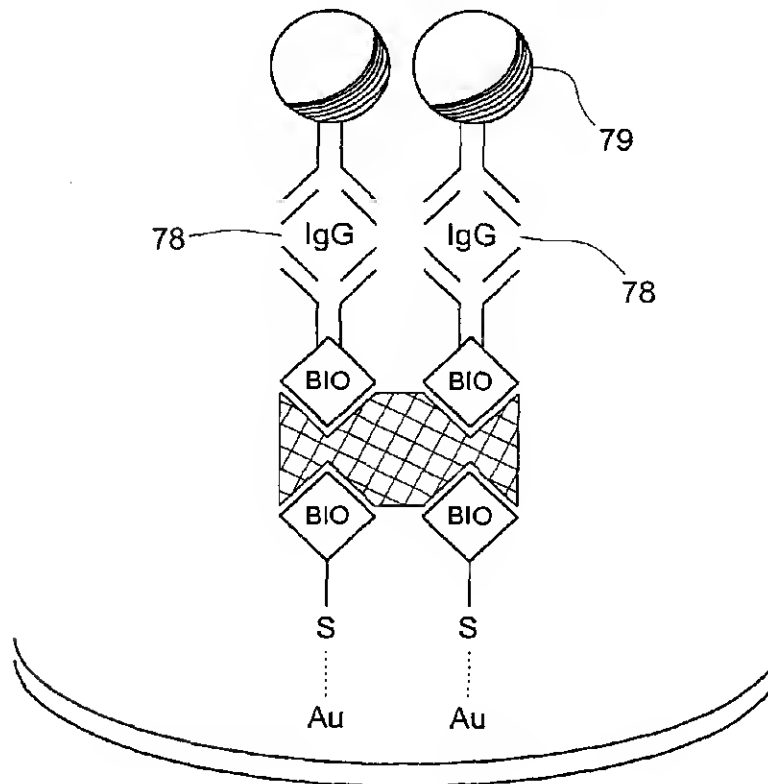


FIG. 7B

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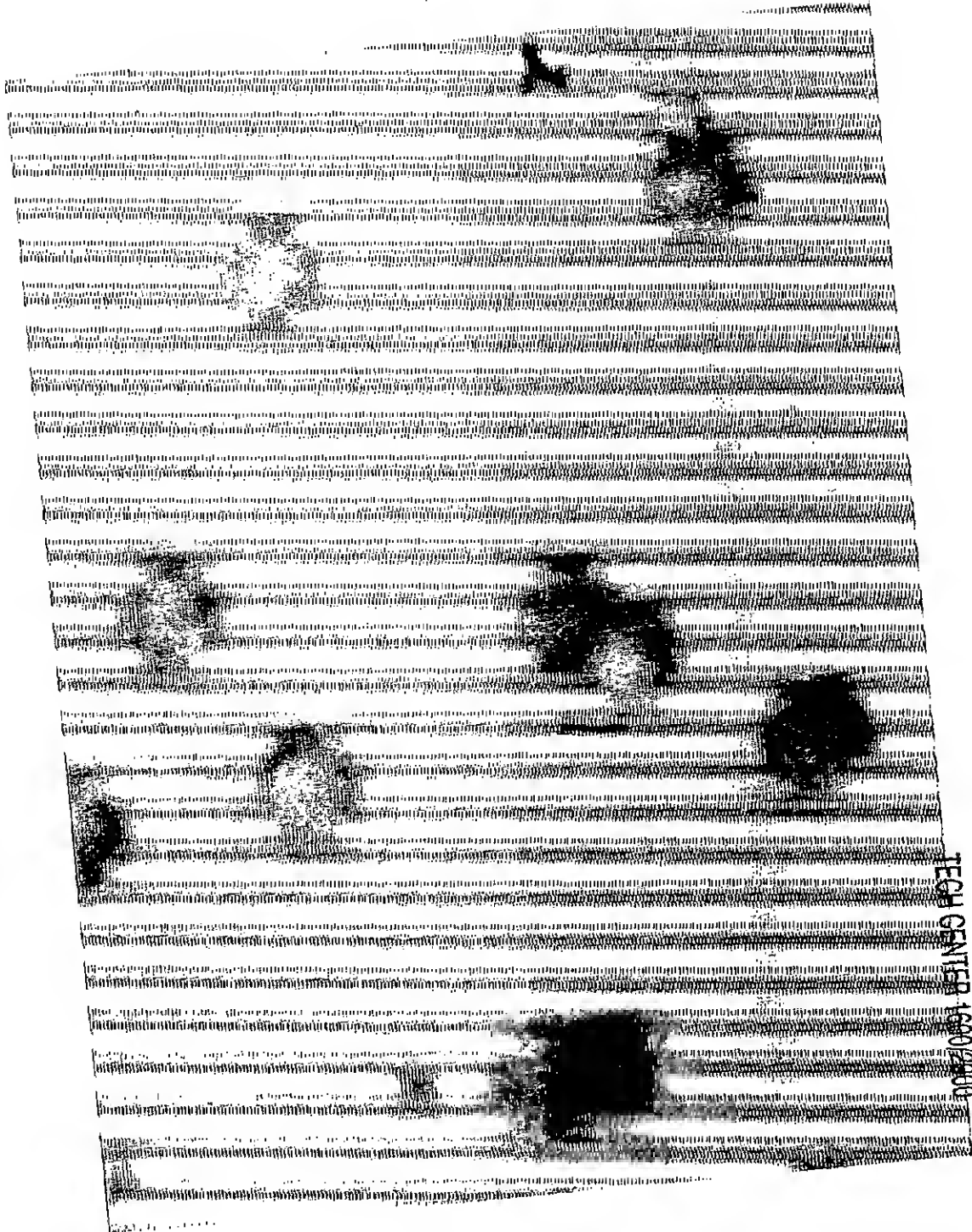
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FIG. 8



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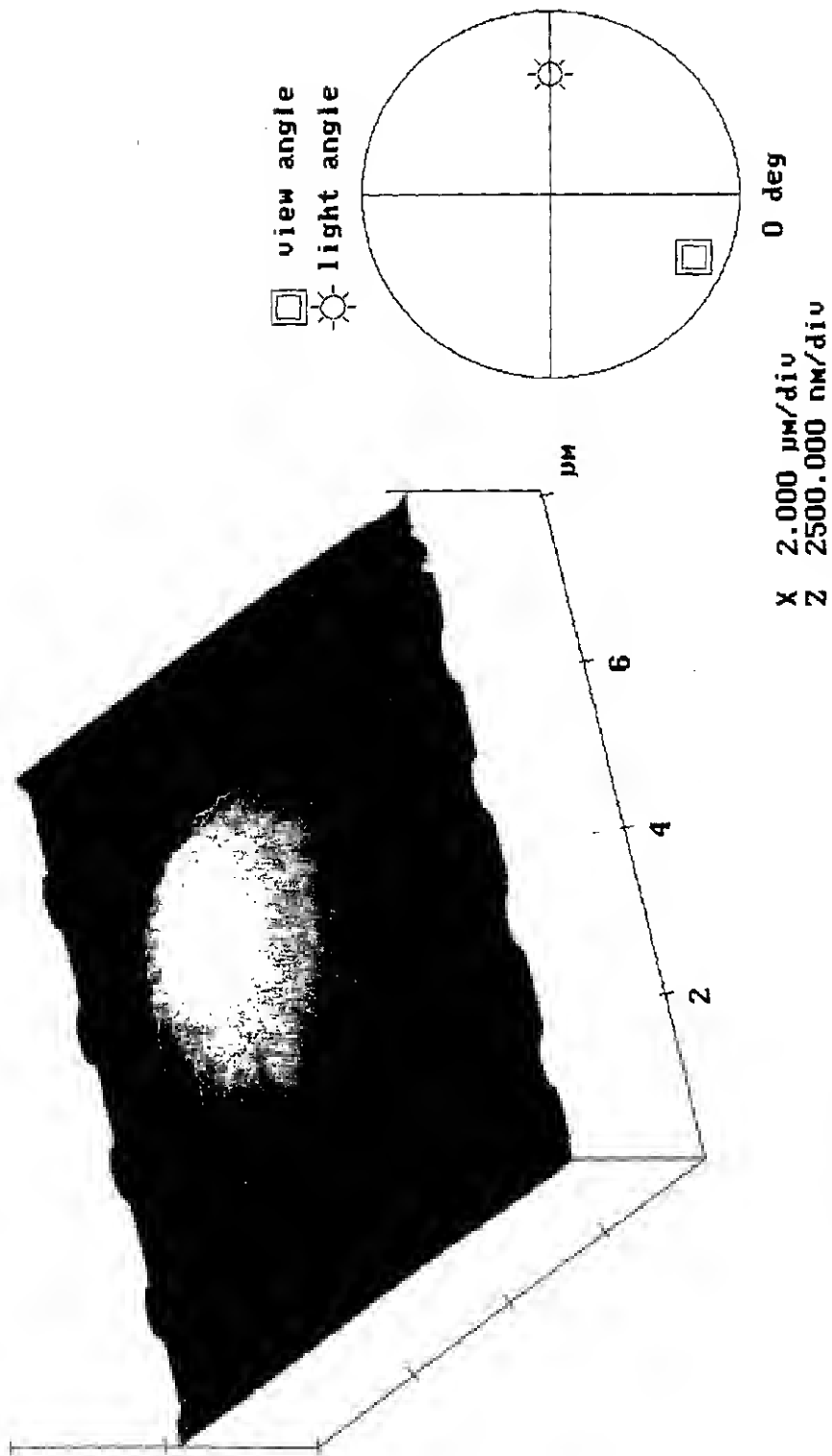


FIG. 9

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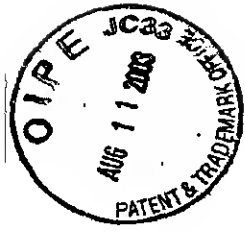
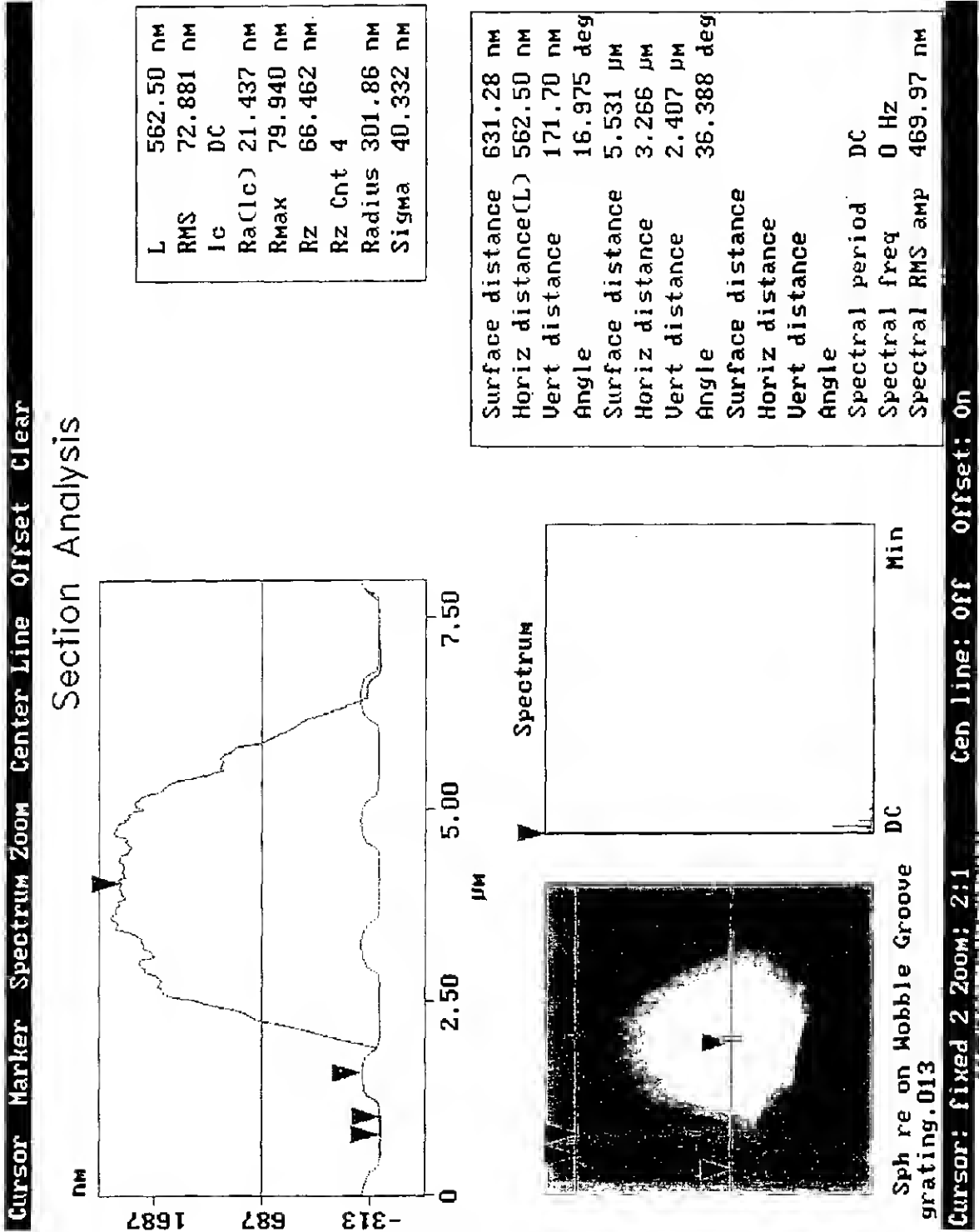
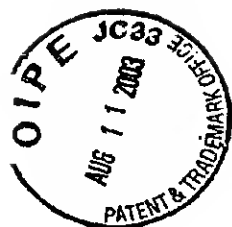


FIG. 10



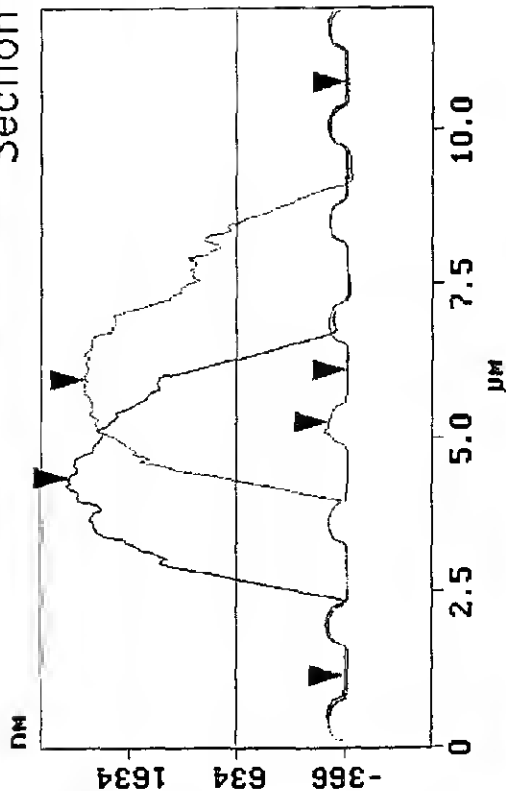


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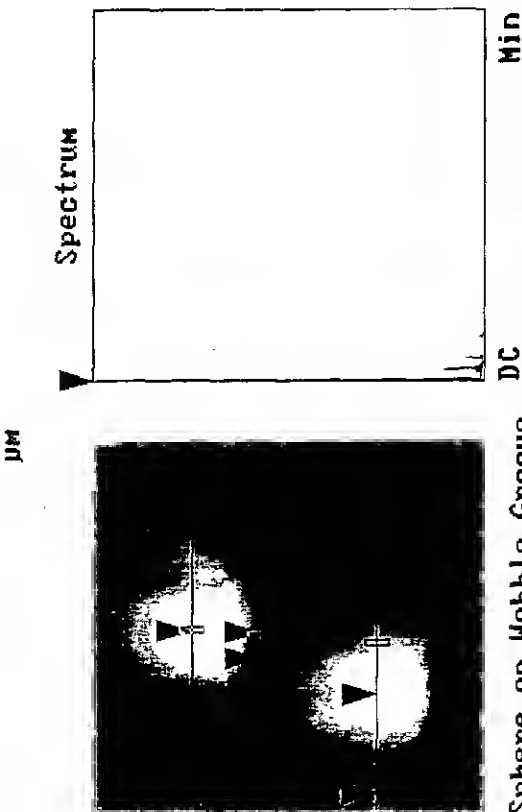
FIG. 11

Cursor Marker Spectrum Zoom Center Line Offset Clear

Section Analysis



L	843.75 nm
RMS	63.849 nm
Ic	DC
Ra(lc)	27.782 nm
Rmax	97.447 nm
Rz	96.754 nm
Rz Cnt 2	
Radius	450.61 nm
Sigma	62.095 nm



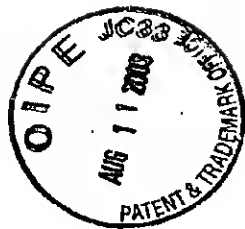
Surface distance	6.867 μm
Horiz distance(L)	4.828 μm
Vert distance	2.445 μm
Angle	26.858 deg
Surface distance	894.27 nm
Horiz distance	843.75 nm
Vert distance	169.96 nm
Angle	11.389 deg
Surface distance	5.302 μm
Horiz distance	3.211 μm
Vert distance	2.568 μm
Angle	38.649 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	461.26 nm

Sphere on Wobble Groove
grating.014

Cursor: fixed 3 Zoom: 2:1 Cen line: Off Offset: On

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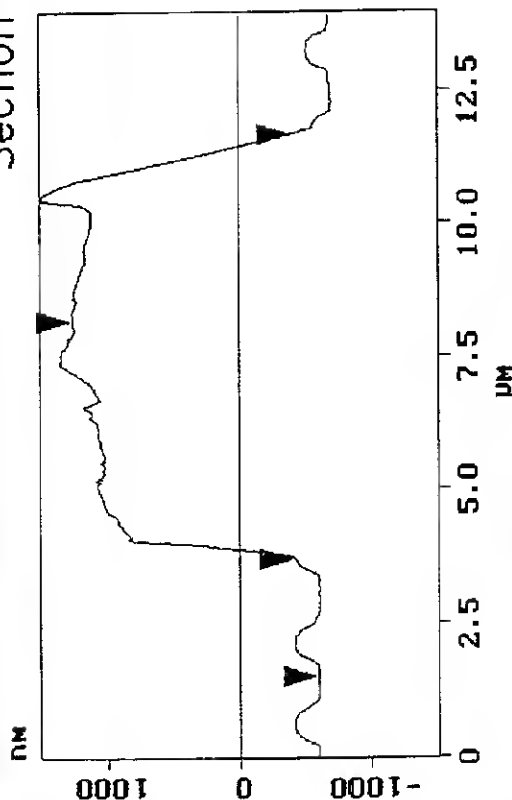


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FIG. 12

Cursor Marker Spectrum Zoom Center Line Offset Clear

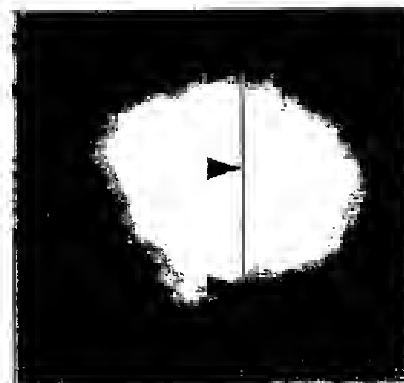
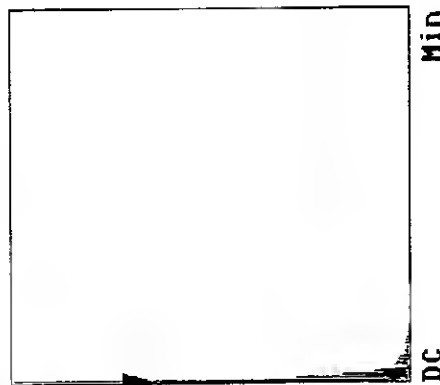
Section Analysis



L	6.672 μm
RMS	782.05 nm
1c	DC
Ra(1c)	284.31 nm
Rmax	1.187 μm
Rz	868.11 nm
Rz Cnt 4	
Radius	3.512 μm
Sigma	426.35 nm

Surface distance	10.707 μm
Horiz distance(L)	7.984 μm
Vert distance	11.549 nm
Angle	0.083 deg
Surface distance	8.179 μm
Horiz distance	6.672 μm
Vert distance	1.860 μm
Angle	15.575 deg
Surface distance	
Horiz distance	
Vert distance	
Angle	
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	493.32 nm

Spectrum

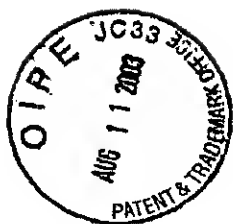


Cells on Movable Groove
grating.016

Cursor: fixed Zoom: 2:1 Cen line: off Offset: off

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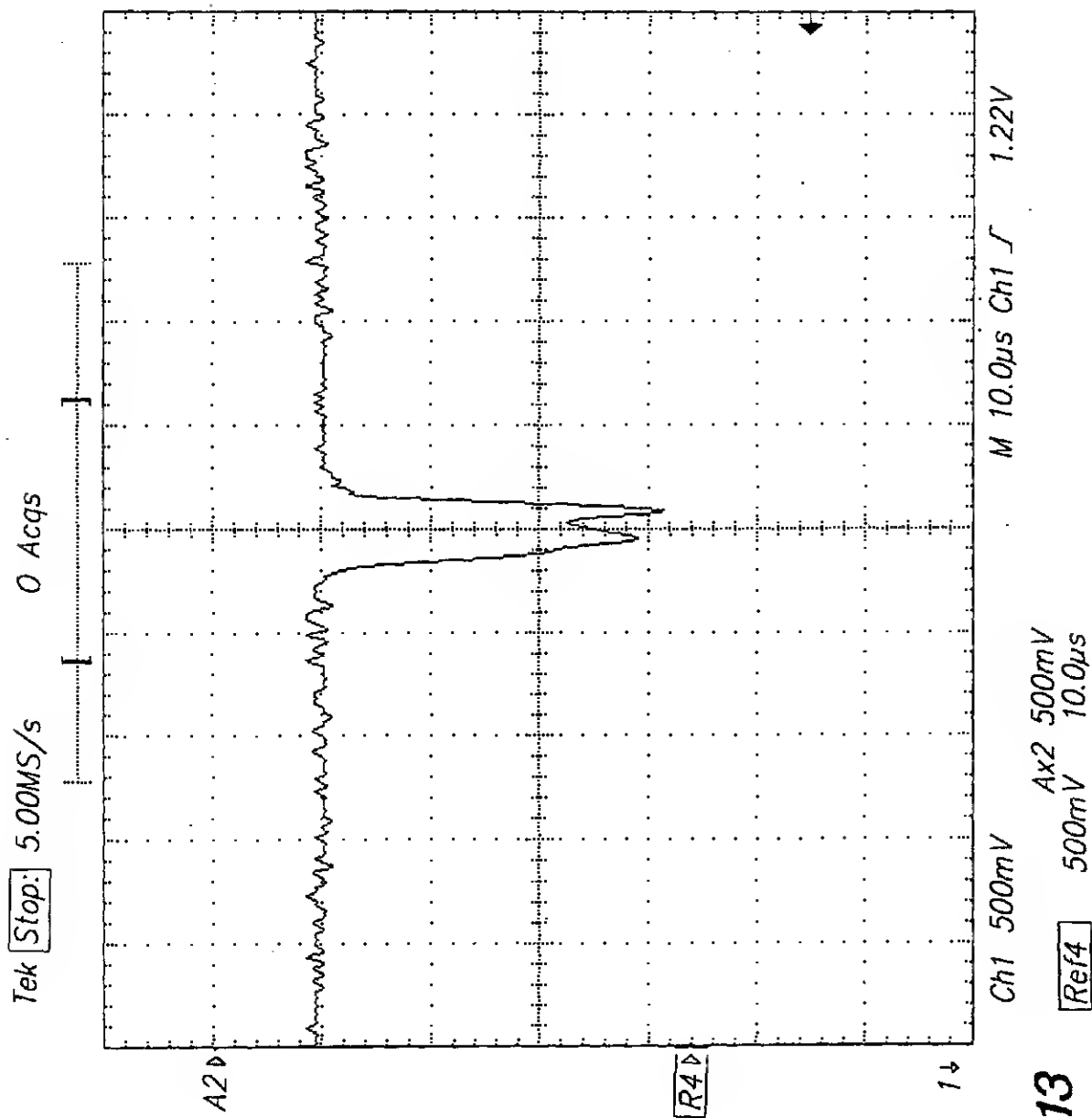
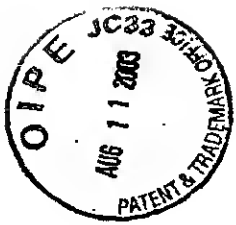


FIG. 13

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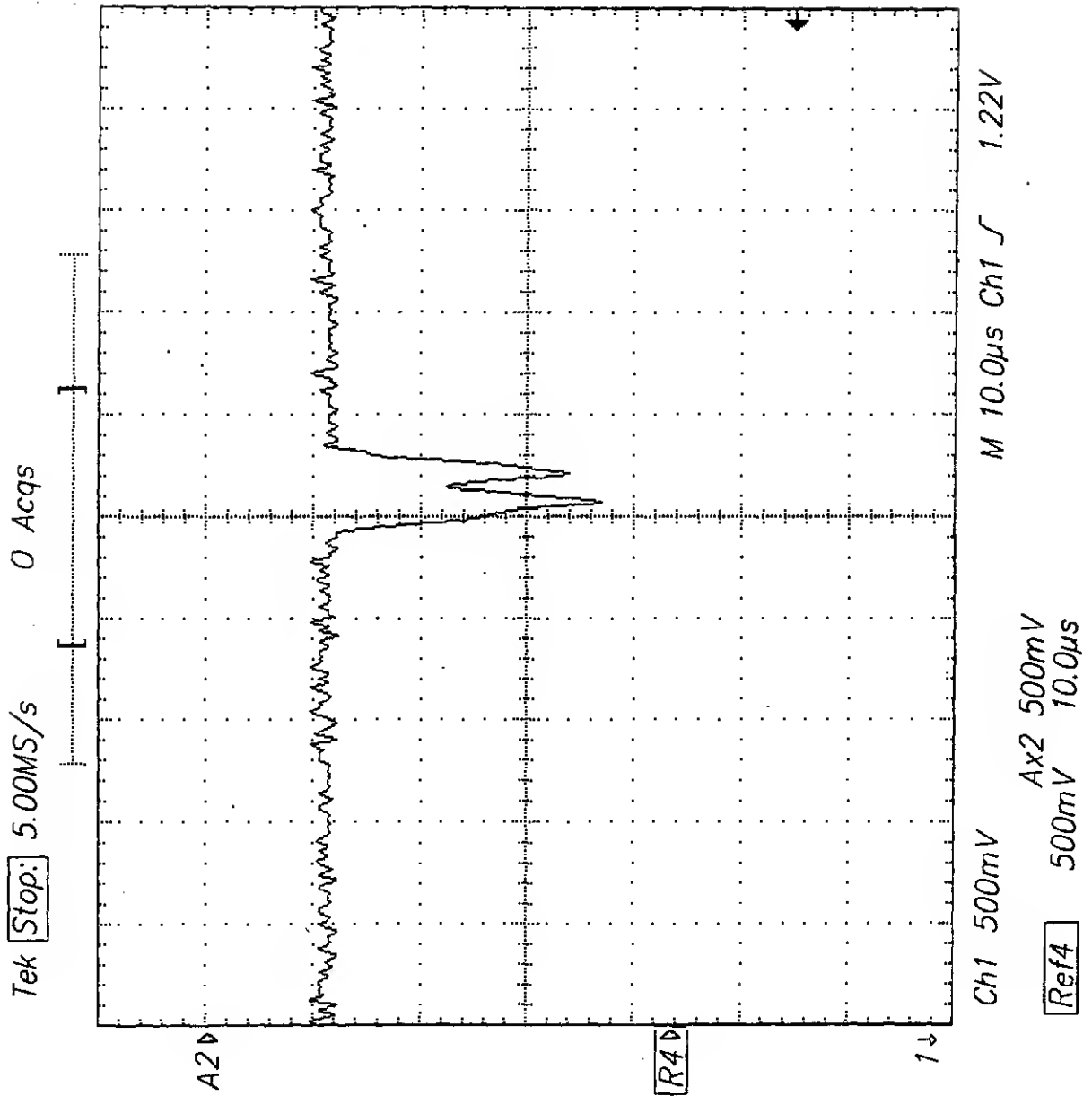
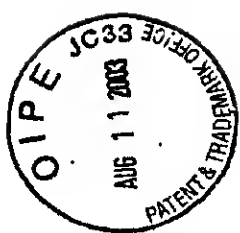


FIG. 14

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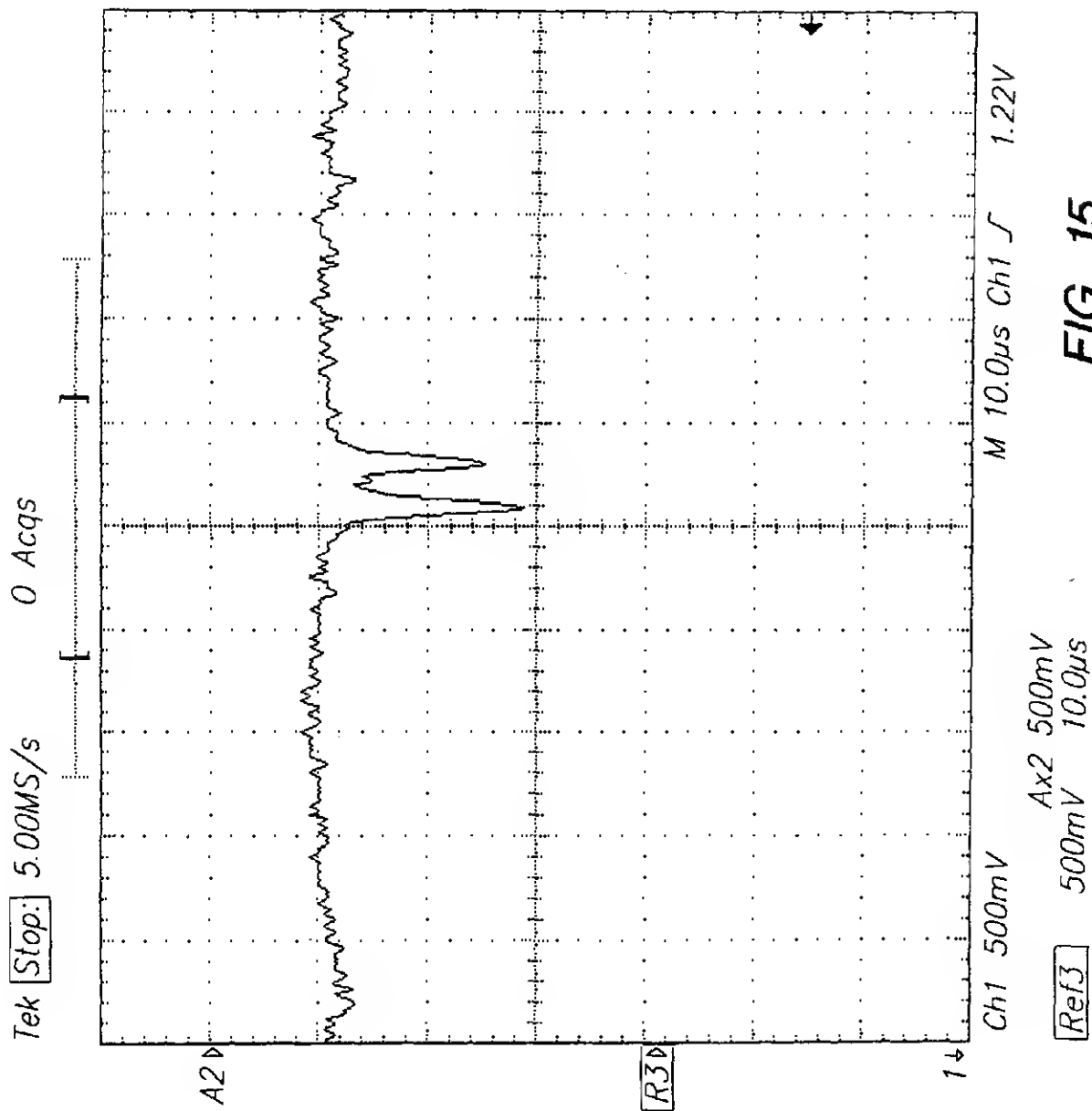
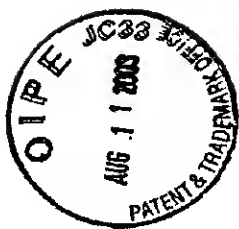


FIG. 15

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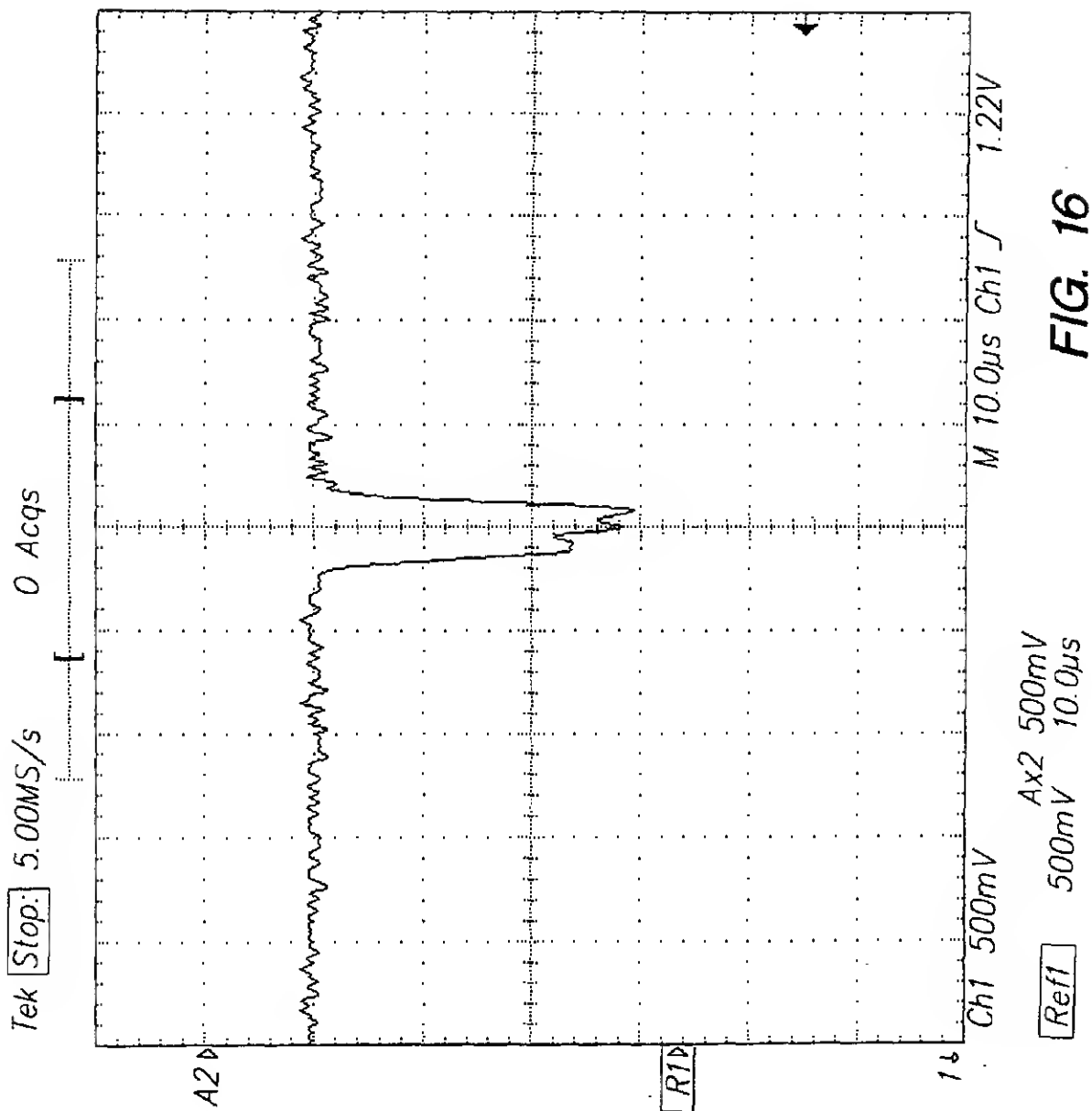
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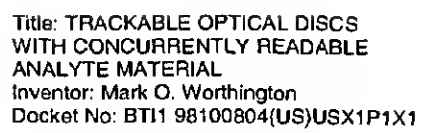
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Tek Stop: 5.00MS/s 0 Acqs

A2

R3

Ch1 500mV

Ref3 500mV 10.0μs

M 10.0μs Ch1 1.22V

FIG 17

FIG. 17

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Ref4 BrstWd
5.68 μ s
Low signal
amplitude
Ref4 Pk-Pk
1.96 V

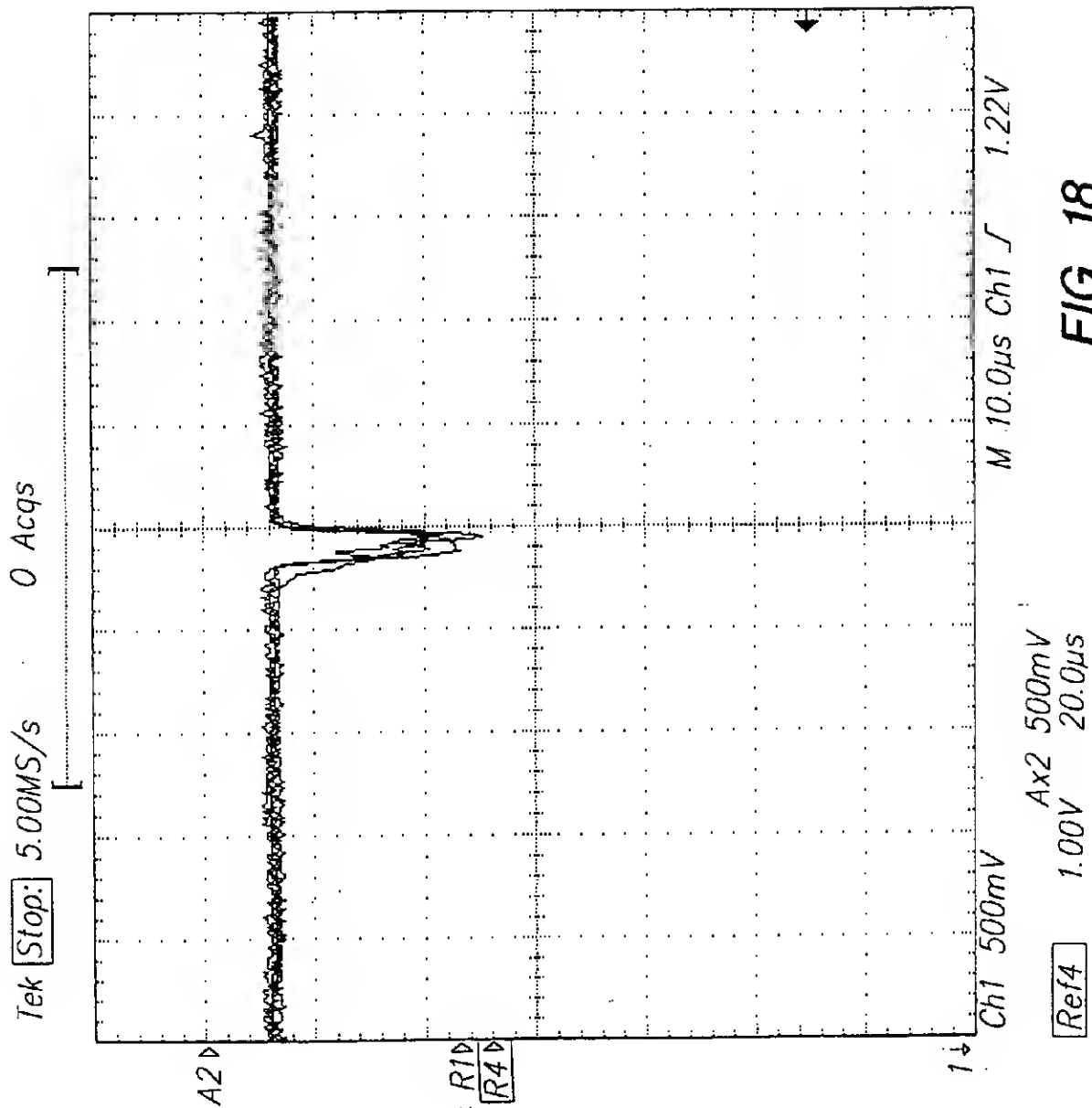


FIG. 18

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FIG. 19

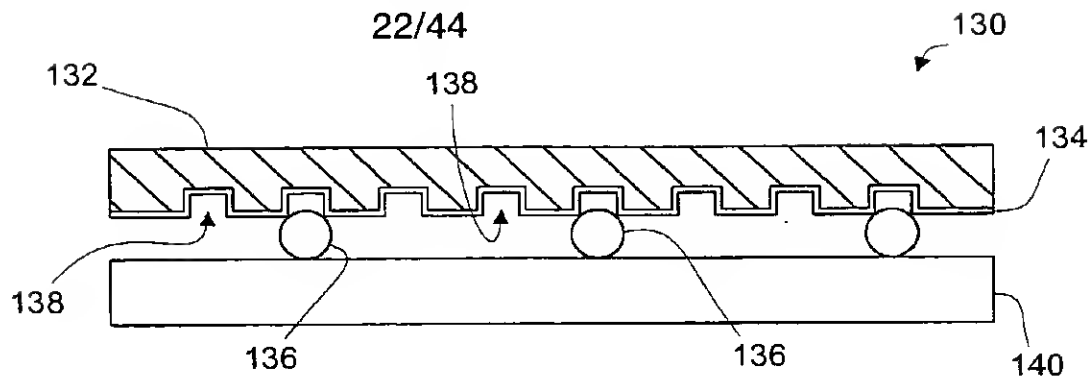


FIG. 20

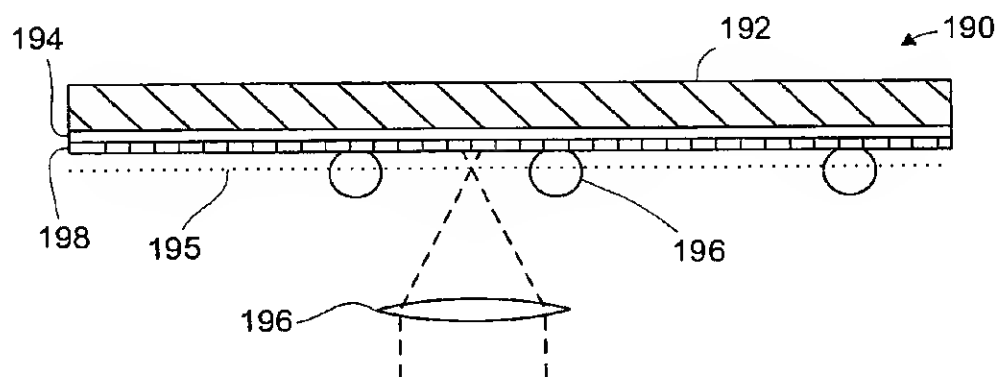
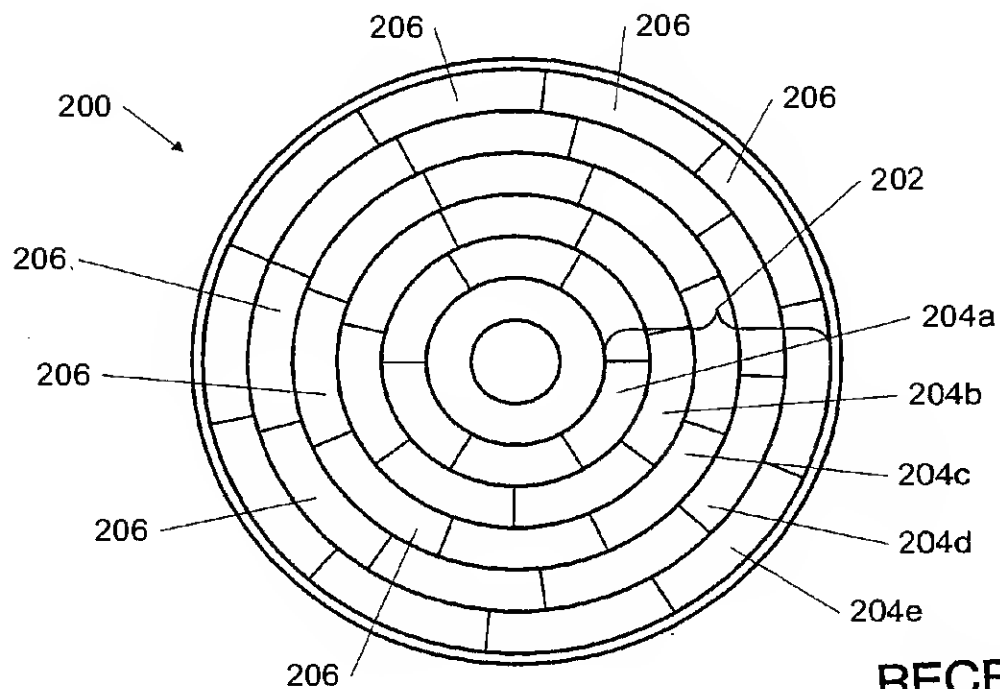


FIG. 21



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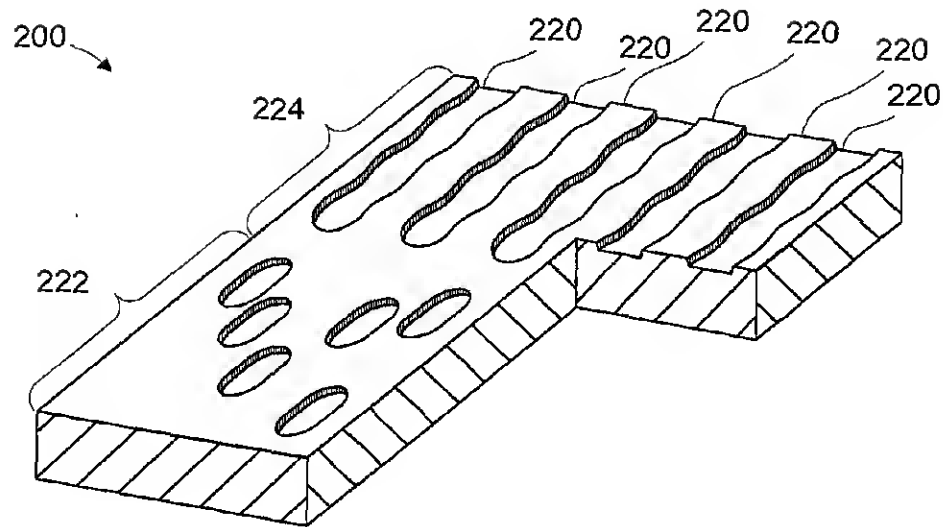


FIG. 22

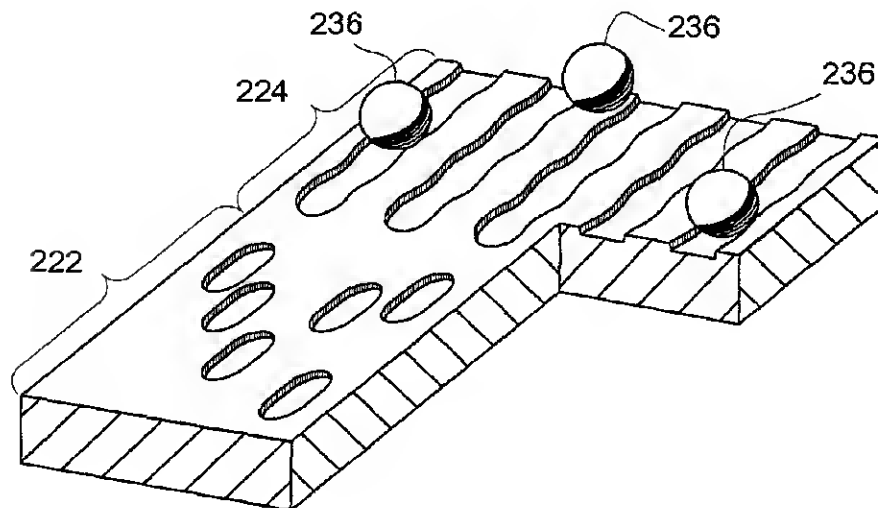


FIG. 23

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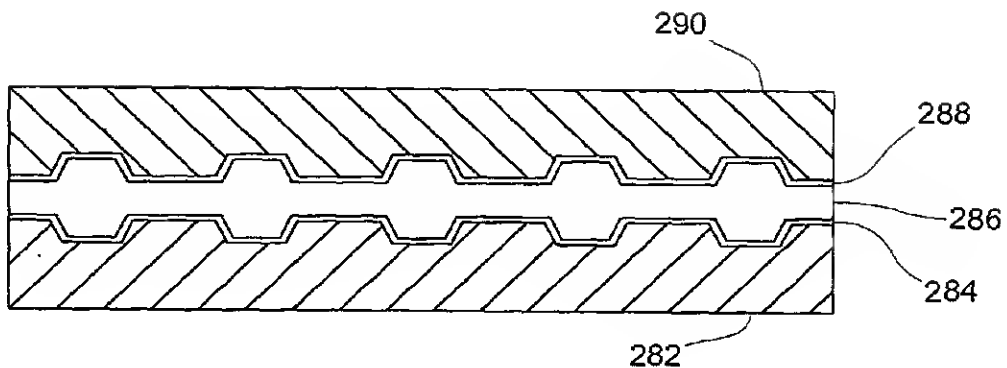


FIG. 24

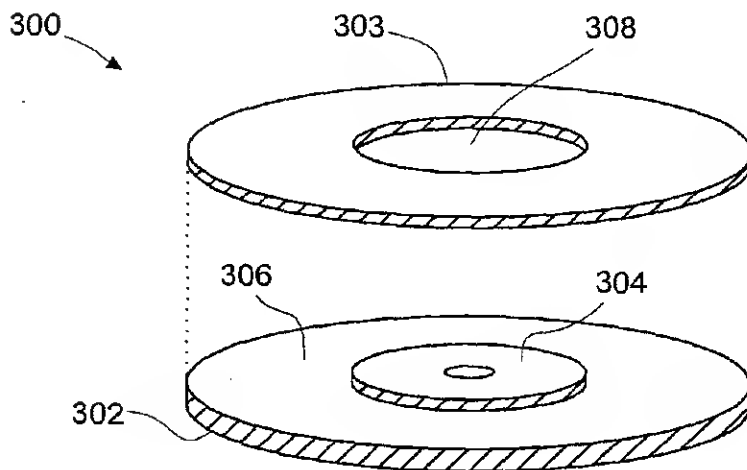


FIG. 25

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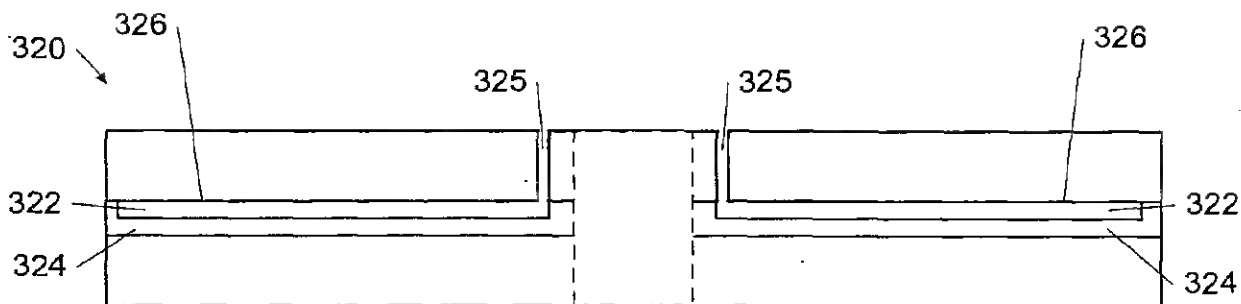


FIG. 26

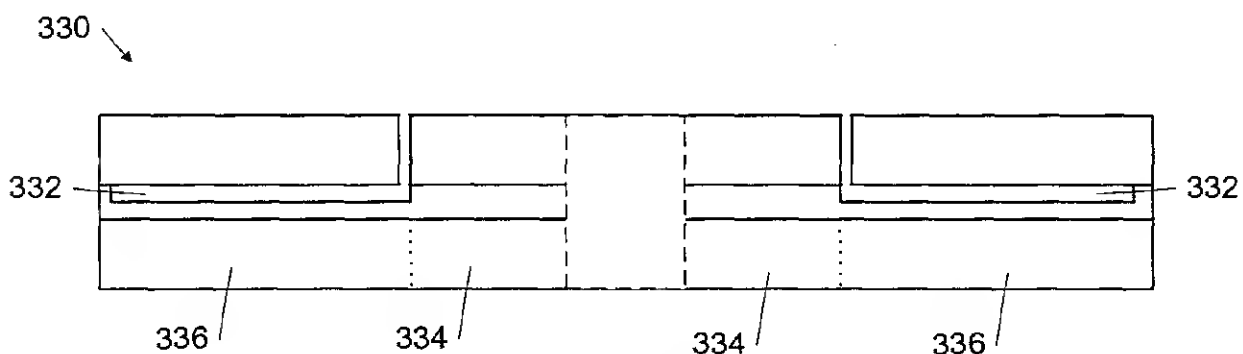


FIG. 27

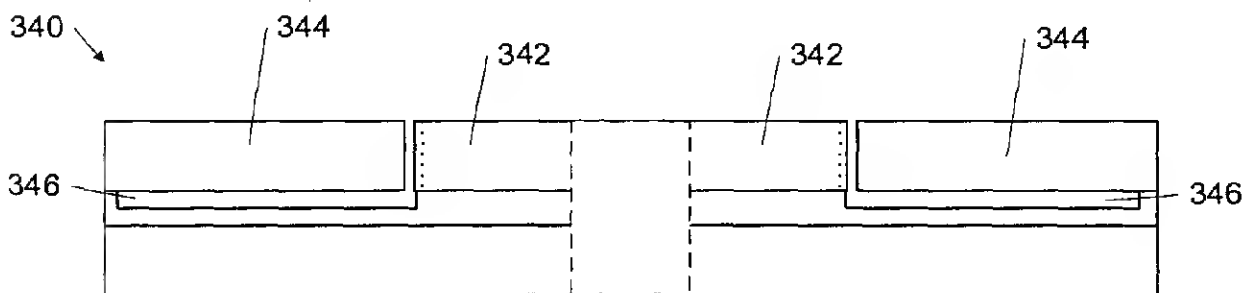


FIG. 28

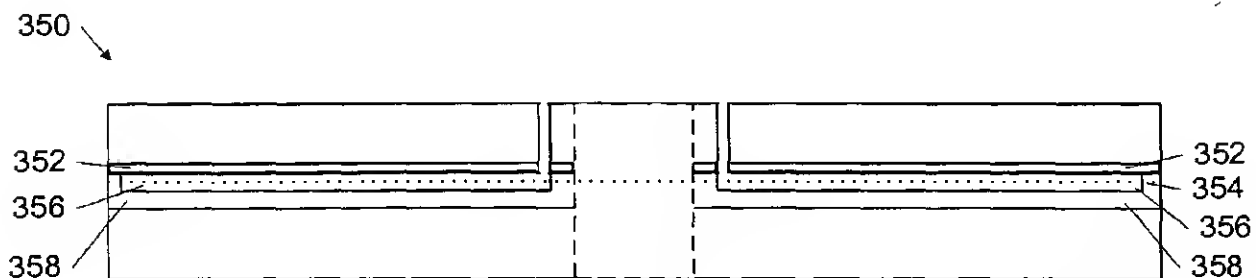


FIG. 29

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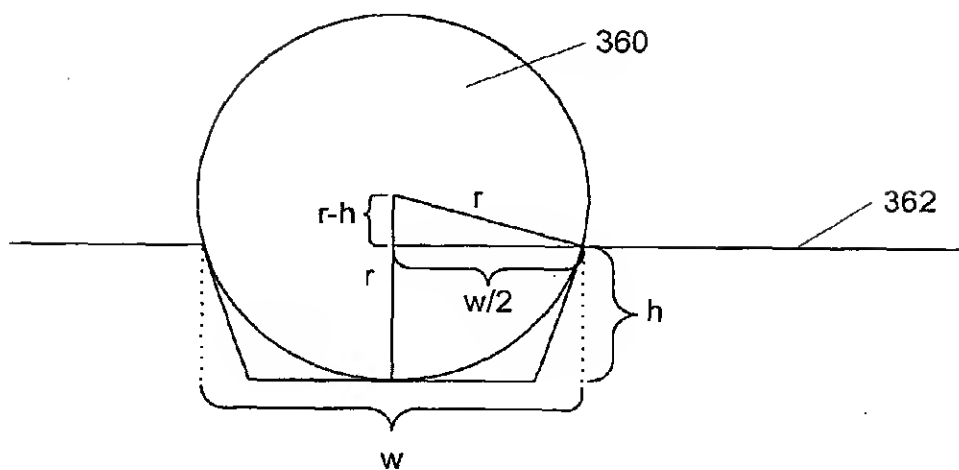


FIG. 30

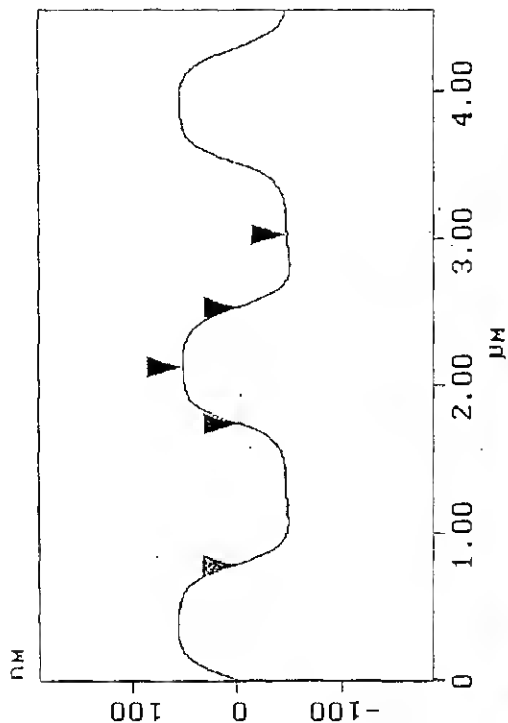
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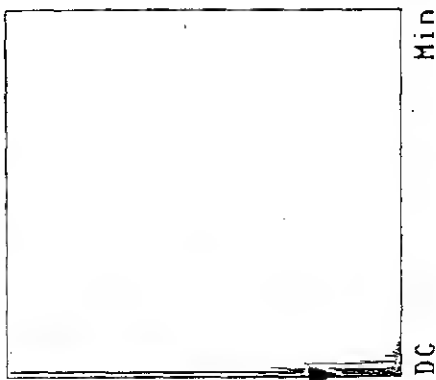
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Spectrum



rm159in.000

cursor: average Zoom: 2:1 Cen line: off Offset: off

FIG. 31

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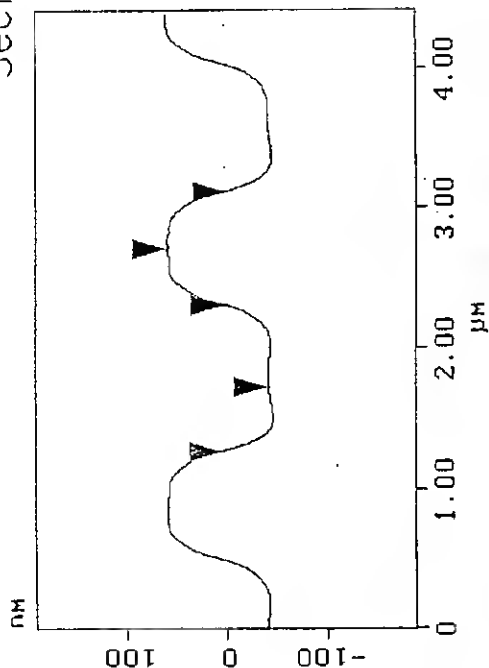
L	800.78 nm
RMS	17.366 nm
Ic	DC
Ra(Ic)	13.284 nm
Rmax	57.853 nm
Rz	57.853 nm
Rz Cnt 2	
Radius	1.427 μm
Sigma	4.388 nm

Surface distance	912.31 nm
Horiz distance(L)	898.44 nm
Vert distance	100.00 nm
Angle	6.351 deg
Surface distance	969.10 nm
Horiz distance	957.03 nm
Vert distance	7.528 nm
Angle	0.451 deg
Surface distance	817.07 nm
Horiz distance	800.78 nm
Vert distance	0.740 nm
Angle	0.053 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	4.523 nm

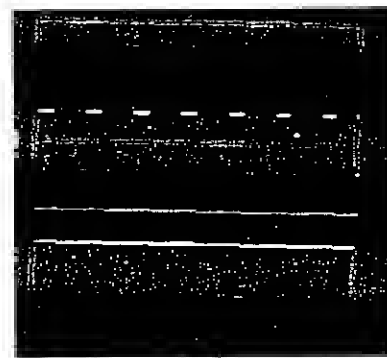
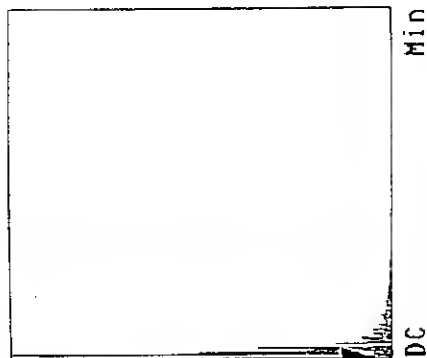


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Section Analysis



Spectrum



rm159out.000

Cursor: average Zoom: 2:1 Cen line: off offset: off

L	820.31 nm
RMS	18.016 nm
lc	DC
Ra(lc)	13.505 nm
Rmax	62.560 nm
Rz	61.145 nm
Rz Cnt 2	
Radius	1.431 μm
Sigma	5.174 nm

Surface distance	991.89 nm
Horiz distance(L)	976.56 nm
Vert distance	101.23 nm
Angle	5.918 deg
Surface distance	1.050 μm
Horiz distance	1.035 μm
Vert distance	7.648 nm
Angle	0.423 deg
Surface distance	840.65 nm
Horiz distance	820.31 nm
Vert distance	3.315 nm
Angle	0.232 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	1.189 nm

FIG. 32

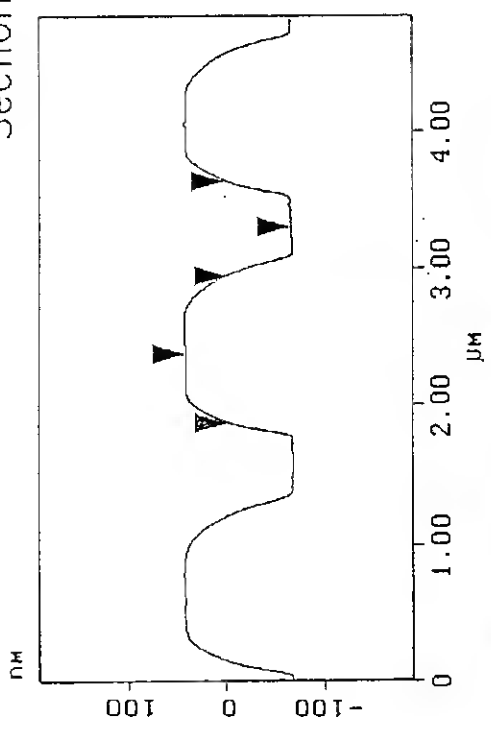
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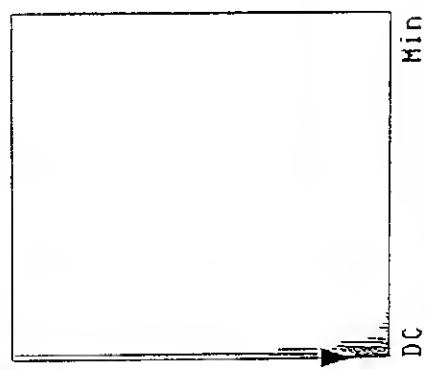


Section Analysis



L	683.59 nm
RMS	21.794 nm
IC	DC
Ra(1c)	16.951 nm
Rmax	67.772 nm
Rz	66.682 nm
Rz Cnt 2	
Radius	820.71 nm
Sigma	8.514 nm

Spectrum



Surface distance	956.26 nm
Horiz distance(L)	937.50 nm
Vert distance	107.52 nm
Angle	6.543 deg
Surface distance	1.084 μm
Horiz distance	1.074 μm
Vert distance	4.127 nm
Angle	0.220 deg
Surface distance	715.65 nm
Horiz distance	683.59 nm
Vert distance	3.943 nm
Angle	0.330 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	3.603 nm

m160in.000

Cursor: average Zoom: 2:1 Cen line: off Offset: off

FIG. 33

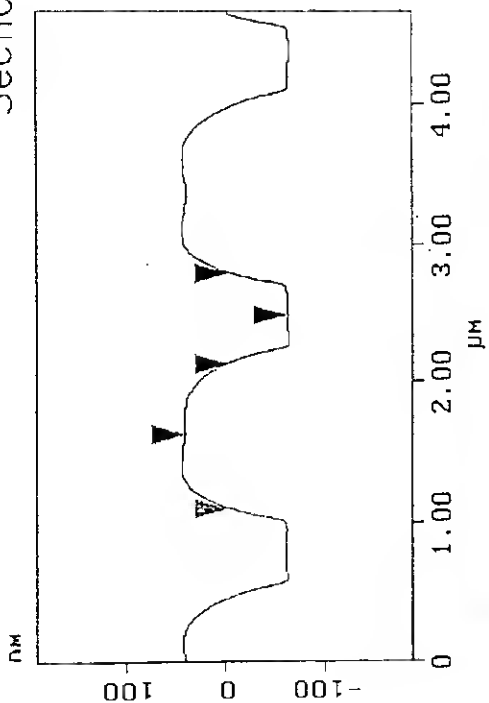
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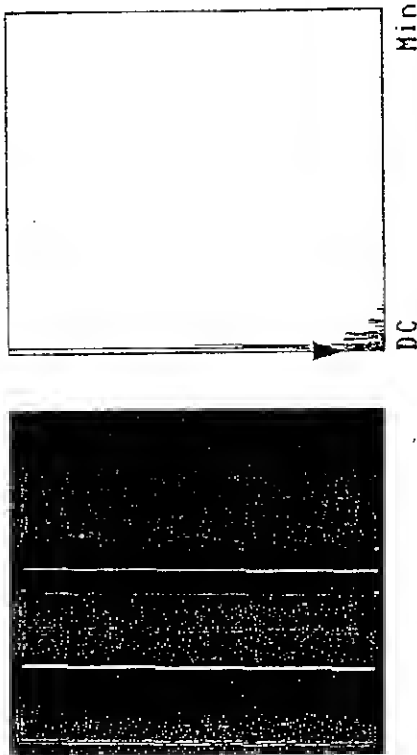


Section Analysis



L	664.06 nm
RMS	20.135 nm
lc	DC
Ra(lc)	14.972 nm
Rmax	66.116 nm
Rz	64.821 nm
Rz Cnt 2	
Radius	824.44 nm
Sigma	8.988 nm

Spectrum



Surface distance	878.62 nm
Horiz distance(L)	859.38 nm
Vert distance	102.80 nm
Angle	6.821 deg
Surface distance	1.046 μm
Horiz distance	1.035 μm
Vert distance	4.540 nm
Angle	0.251 deg
Surface distance	695.52 nm
Horiz distance	664.06 nm
Vert distance	2.814 nm
Angle	0.243 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	3.340 nm

m160out,000

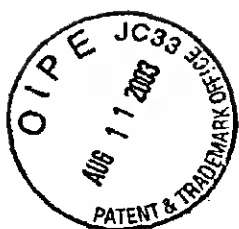
Cursor: average Zoom: 2:1 Cen line: off Offset: off

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FIG. 34

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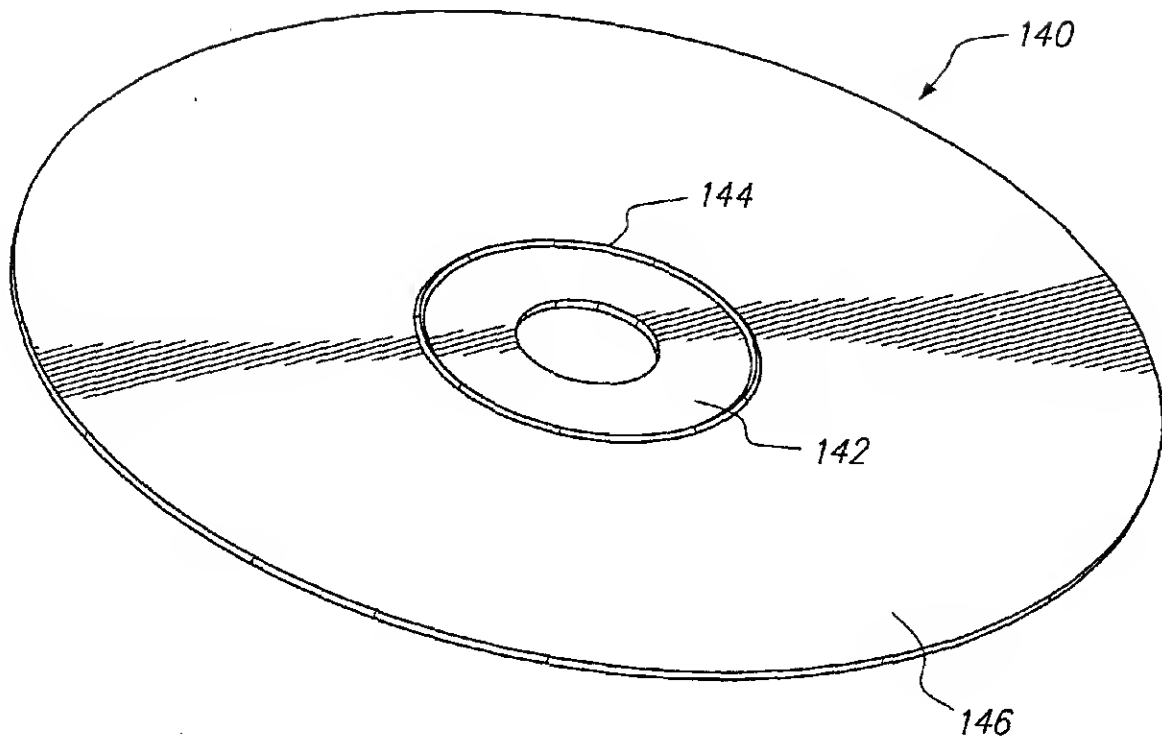
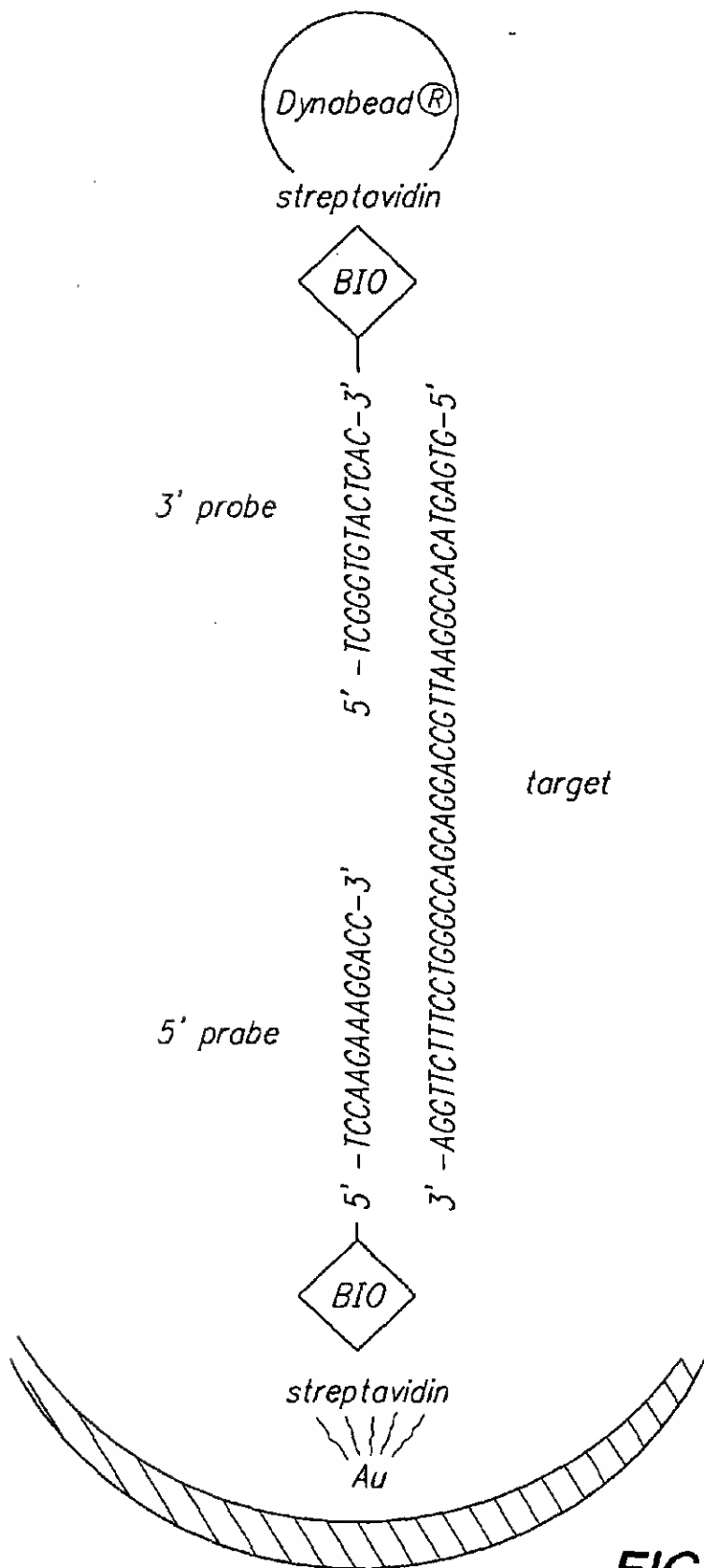


FIG. 35

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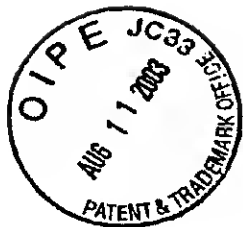


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FIG. 36



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FIG. 37A

20 femtomoles

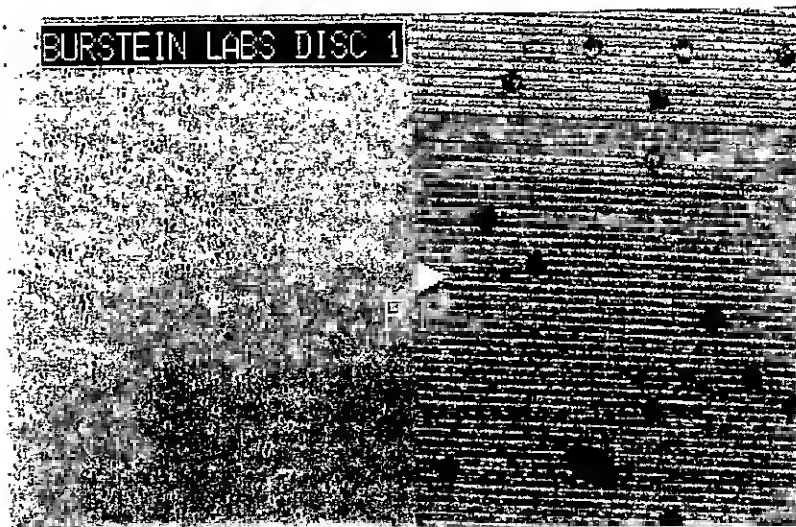


FIG. 37B

20 attamoles

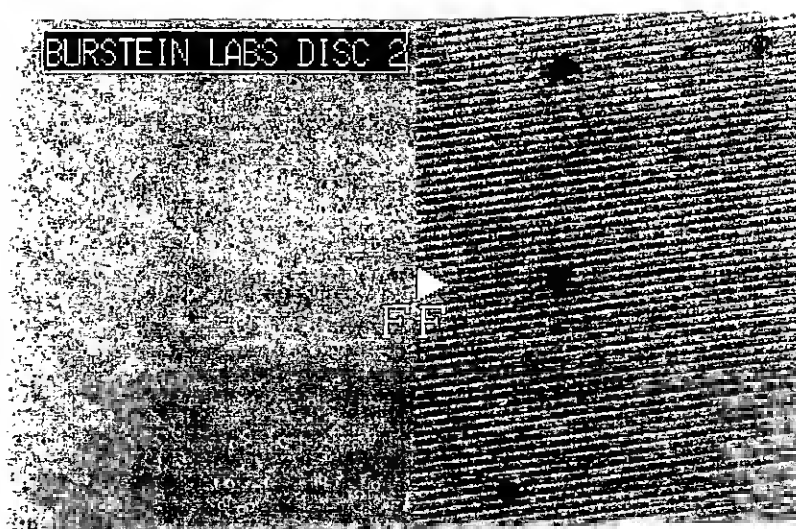
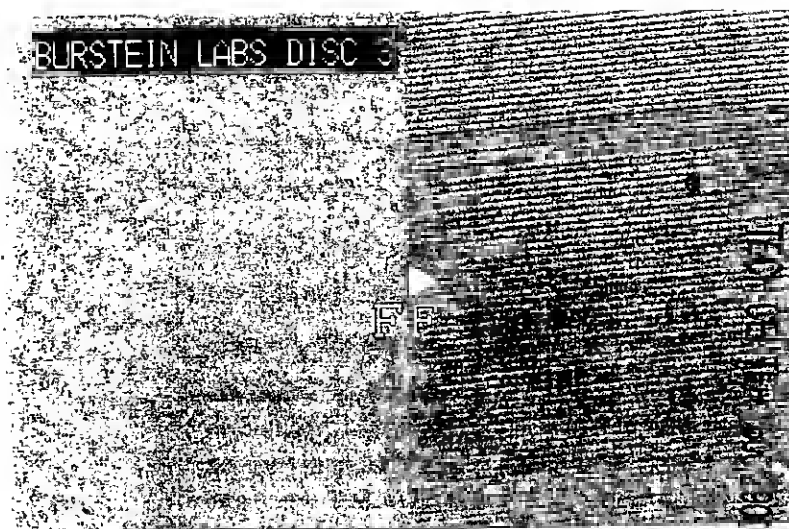


FIG. 37C

20 zeptomoles



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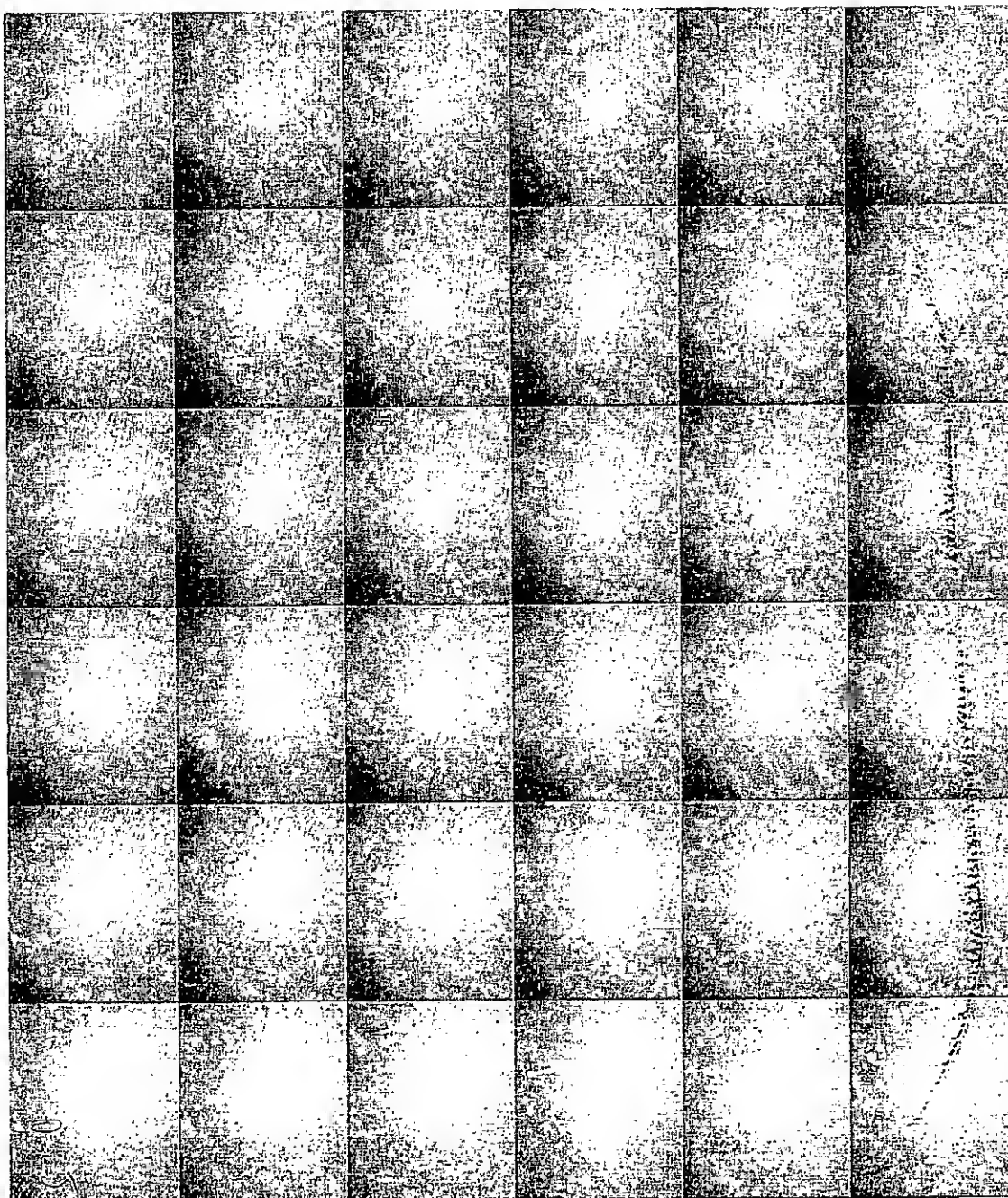
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FIG. 38



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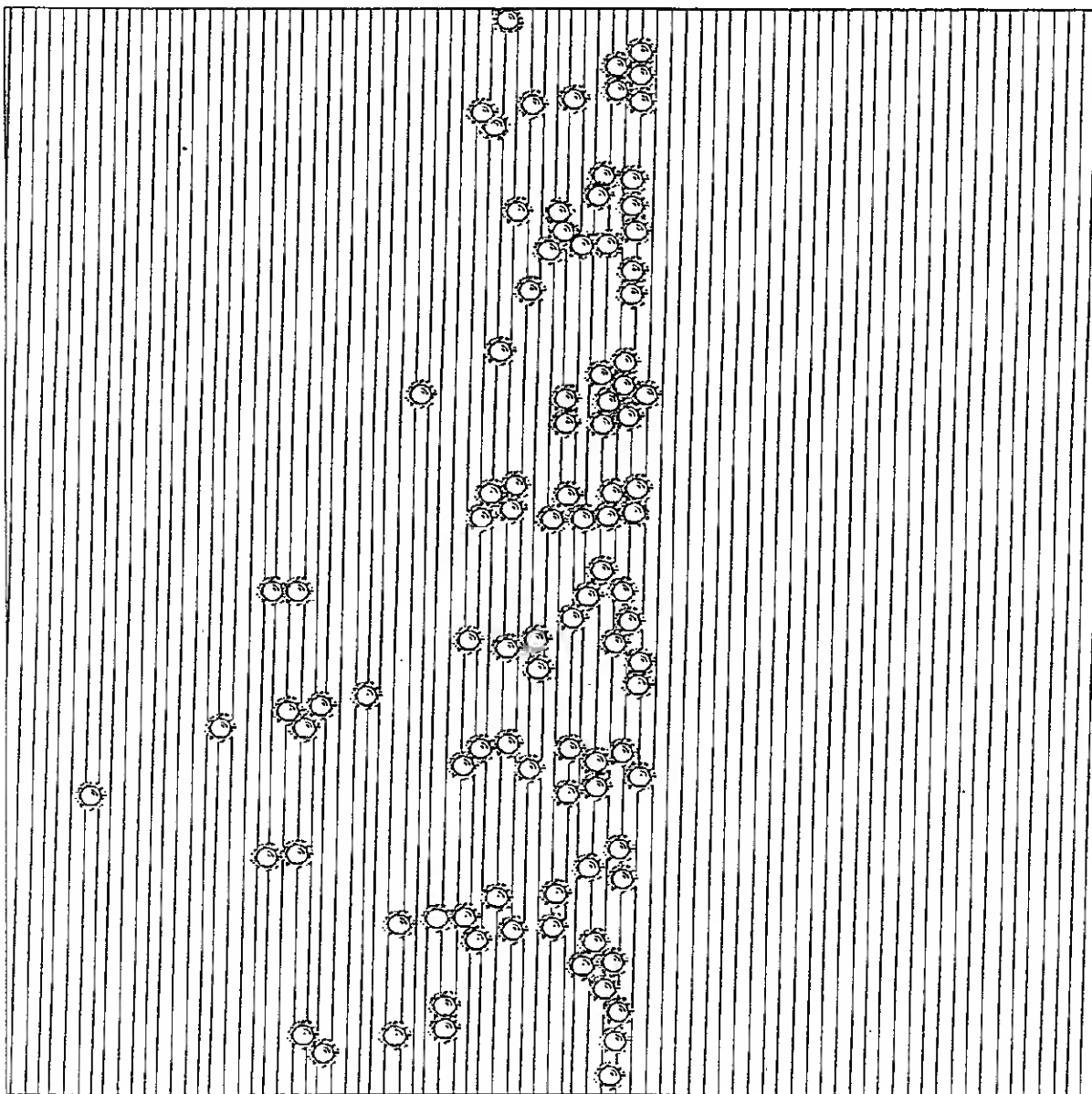


FIG. 39

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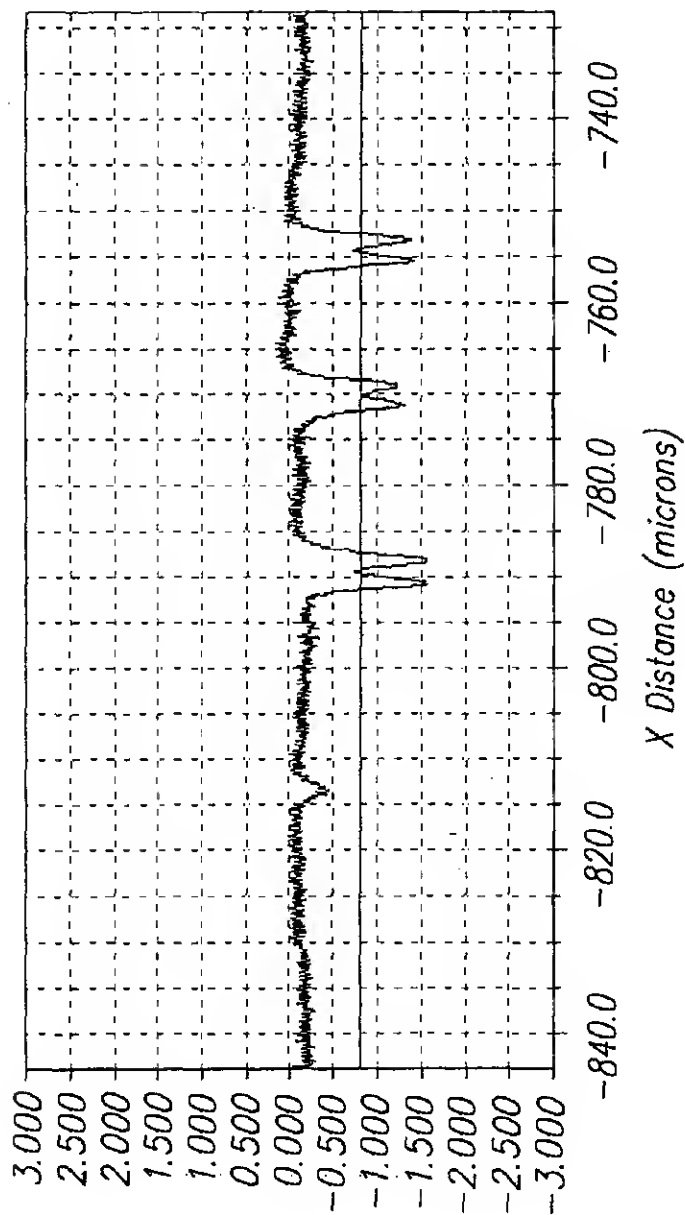


FIG. 40

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AWM Muri		Supplementary sheet, mold acceptance test				CD-3-AWM	
Jab No	36-10236	Agent	CR-R	Ram hold	vac + mech	IFPI	-
SM Order No	9N.96293	Customer	Eximpo CS	Ram dio.	24	Product Code No.	256

Dimensions	0°	90°	180°	270°	Visual faults	1/4 Center hole	✓
0°=mold at top	R15	1.15	1.155	1.15	Streaks	1/4 Stacking graave	✓
Thickness	R40	1.155	1.155	1.155		1/4 Infa	✓
Center hole	15.05+/-0.3	15.05	Drm. 120+/-0.3	mm		1/2	✓
Weight in g	Min	0	15	30	Clouds	1	✓
Measure every 15 min.	g	15.26	15.27	15.26	Voids	3	✓
during test	g	15.26	15.26	15.26	Block dats	3	✓
Mox. diff±0.1 g			15.26	15.26	Matt outer edge	3	✓
					Burrs	3	✓
Water in mold	ACTUAL	DESIRED	Tal.		Scratches	3	✓
Sprue bush	9	ltr./Min.	7	-1/+3	Diesel effect	3	✓
Embosser	6	ltr./MIN.	7	-1/+3	Brawn Discoloration	5	✓
Vacuum	without with	diff.	tal.				
Hondling	bar				Molding compound cald		
Ram	bar				Thickness of cavity (3)	1.462	
Mold Function					Venting gap (5)	0.33	
Embosser	✓	Row material			Position af embosser (9)	0.876	
Sprue ejector	✓	Makrolon 2005	✓		Position af spure bush (10)	0.162	
Ejectar sleeve	✓	Lexon 1020			Embossing strake	0.7	
Sprue bush	✓	Panlite 5503					
Air outlet					Measuring means		
FS dio.	✓				Palorized light	1	
BS dio.	✓				Halagen light	2	
					Neon Light	3	
					Black (UV Light)	4	
					White paper	5	
					Micrometer	6	
					Balance	7	

FIG. 41A

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01.01 Mold movement

Closing movement		Closing time	T32	=	000.
	V33 = 100%	S33 = 019.0mm			
Pressure initiation	V34 = 100%	S34 = 000.7mm			
Opening movement		Opening time	T36	=	000.
	V41 = 100%	S41 = 055.0mm			
Braking	V42 = 010%				
Pause time	T40 = 000.000s	Mold position	S640	=	075.
Mold closing pressures					
Closing pressure	P682 = 085%				
Pressure Build-up	P681 = 020%	T681 = 000.10s			
	C608 = 0	Switched off			

02.01 Summary of mold auxiliary controls/robotics

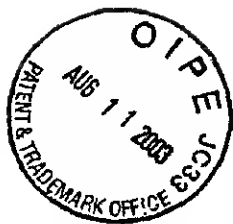
Enable removal	T680 = 0065.0				
Delays					
Blow off sprue	T602 = 000.03	Sprue blowing time	T603	=	000.1
Advance ejector pin	T53 = 000.10s				
Transfer stroke forward	T55 = 000.12s				
Transfer Stroke return	T56 = 000.15s	Extend removal	T668	=	000.2
Embossor forward	T62 = 001.20s	Embossor return	T63	=	000.1
Blow on nozzle side	T75 = 000.50s	Nozzle side blowing time	T74	=	000.8
Blow on moving side	T671 = 000.00	Moving side blowing time	T71	=	000.1
Unit Forward	T680 = 000.70s				
Starting program	C683 = 00000	T683 = 000.00s	S683	=	0004.
Cyle time	T11 = 009.05s				
Removal time	T640 = 000.70s				

FIG. 41C

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FIG. 41D

03.01 Metering

Screw retraction	C17 = 0	Switched off		
Metering Delay	T20 = 000.50 s			
Metering stages	C124 = 2	Metering time	T21 =	005.9
	S23 = 026.0 mm	P23 =	0060 bar	N23 = 100 1.
Metering end point	S24 = 029.0 mm	P24 =	0010 bar	N24 = 020 1.
Holding pressure	P27 = 0010 bar	Start of injection	S0 =	029.0

04.01 Injection

Enable injection	S682 = 0002.0 mm	Screw position	S641 =	029.0
Injection values	C121 = 10	Start of injection	S0 =	029.0
	V196 = 0050 mm/s	S196 =	030.0 mm	
	V197 = 0062 mm/s	S197 =	027.6 mm	
	V198 = 0085 mm/s	S198 =	025.6 mm	
	V199 = 0115 mm/s	S199 =	024.0 mm	
	V200 = 0120 mm/s	S200 =	019.8 mm	
	V201 = 0110 mm/s	S201 =	016.2 mm	
	V202 = 0085 mm/s	S202 =	009.5 mm	
	V203 = 0065 mm/s	S203 =	008.0 mm	
	V204 = 0040 mm/s	S204 =	004.0 mm	
	V205 = 0025 mm/s	S205 =	001.5 mm	T2 = 000.3
Enable V/P changeover		V/P changeover point	S11 =	004.0
Forcible changeover				
Flow number	S121 = 018.2 mm	S122 =	015.0 mm	C125 = 2776
Pressure monitoring		Peak pressure	T201 =	P125 = 01044
First stage	P101 = 01300 bar	T201 =	00.02 s	
Second stage	P102 = 01100 bar	T201 =	00.02 s	S102 = 006.0

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FIG. 41E

04.02 Holding pressure, cooling				
Holding pressure values	C122 = 04 P12 = 00550 bar	Changeover point	S11 = 004.0	
	P117 = 00420 bar	T117 = 000.20		
	P118 = 00380 bar	T118 = 000.40		
	P119 = 00200 bar	T119 = 000.90		
Holding pressure time		T120 = 002.00		
Cooling time	T39 = 005.30 s			
Melt cushion monitoring		Melt cushion	S19 = 003.7	
Upper limit	S219 = 010.0 MM	Lower limit	S119 = 000.5	
05.01 Nozzles, unit, purging/dry cycles				
Standstill monitoring	C606 = 60 min	C640 = 0004 min		
Unit				
Unit forward	T680 = 000.70 s	V29 = 030 %		
Lift	T30 = 000.30 s	V30 = 050 %		
Unit set-up and manual movements				
Move forward	V816 = 030 %	Lift V806 = 030 %		
Purge/dry cycle/clean				
Number of metering strokes	C16 = 20	C201 = 50		
Metering	S16 = 028.0 mm	P16 = 0060 bar	N16 = 200	
Injection	S18 = 001.5 mm	V101 = 05 mm/s		
Delay for purging	T606 = 000.00 s			

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FIG. 41F

06.01 Temperature control, plottifier zones/temperature control devices

Zone/description	Set point	Actual value	Reduced Tolerance		Heating outputs	Cooling
			minus	plus		
10 Melt temperature	310° C	305° C	180° C	040° C		
30 Nozzle	330° C	330° C	180° C	040° C	014%	
13 Nozzle	315° C	315° C	180° C	040° C	025%	
Cylinder head	310° C	310° C	180° C	040° C	008%	
15 Compression	305° C	305° C	180° C	040° C	005%	
16 Compression	305° C	308° C	180° C	040° C	006%	
18 Feed	300° C	295° C	180° C	040° C	070%	
20 Inlet	060° C	060° C	060° C	040° C		024

Zone/description	Set point	Actual value	Reduced Tolerance		Heating outputs	Cooling
			minus	plus		
24 Heating/cooling device	112° C	093° C	050° C	020° C	000%	000
25 Heating/cooling device	114° C	091° C	050° C	040° C	000%	000

08.01 Disk transfer

Peripheral interface	C684 =	0	Without signal acknowledgement
Buffer switch-off size	C680 =	65000	
Production delay	T682 =	001.00 s	With interruption of cycle
Max. transfer time	T681 =	001.00 s	

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FIG. 41G

09.01 Production control									
Application		C340 = 2		No application					
Date set number		C315 = 100							
Production sequence									
Item number		C303 = 1		Piece counter	C324 = 29270				
				Cycle counter	C325 = 29270				
Cycle time		T11 = 009.05 s		Failure rate	C718 = 30.56%				
Production preparation				Reason	C357 = 00				
10.01 Process statistics									
Q monitoring		C340 = 2		Monitoring without screening out					
Q report		C700 = 0		No report					
Total		cycles of which		out of tolerance		failure rate			
		C325 = 29270		C318 = 8946		C718 = 30.56%			
Random sample		C326 = 29269		C338 = 8946		C738 = 30.56%			
Process variables		Set Point	Tolerance	Actual Value	Mean	Scatter	Out of Tolerance		
		x	+/-	x	xq	3s			
Metering time		1.20	0.30	5.98 s	2.32	5.408	-06786		
Injection start		30.1	2.0	29.0 mm	28.6	0.82	2028		
Injection time		0.47	0.20	0.33s	0.39	0.105	0		
V/P changeover point		3.5	1.0	4.0 mm	4.0	0.04	0		
Melt cushion		4.2	1.0	3.7 mm	3.8	0.25	0		
? peak value		600	200	871 bar	682	99.9	-06566		
? peak value		0		0 bar	0	0.0			
Flow number		2500	300	2776	2441	99.9	359		
Cycle time		3.90	0.50	9.05 s	5.08	6.421	-06570		

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FIG

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